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ABSTRACT

This project was conducted for the following purposes: (1) to research current literature and the automatic data processing industry to determine needs in the field of data processing; (2) to assess the need for professional development of secondary vocational data processing instructors, and (3) to validate occupational competencies to be acquired by students completing secondary vocational data processing programs. Through a review of literature, procedures were developed for establishing a project advisory committee, conducting an instructors' needs assessment, preparing a list of validated competencies for a curriculum in data processing, preparing and submitting reports, maintaining communication and coordination, and evaluating the project. Following the literature review, a description of activities needed to achieve tasks was drawn up, a management plan and timeline were created, and external communications and coordination were established. As a result of the project, the following products were developed: a list of validated competencies for developing a data processing curriculum; a list of professional development needs of instructors; a state-of-the-art paper that identified needs of business and industry in data processing and suggested ways for modifying materials for use with handicapped students and students with limited English, promoting equal access to education, and computer applications; quarterly reports; and this final report. (Half of the document consists of these project products.) (KC)

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Final Report

Contract No. 44420021

UPDATE OF SECONDARY VOCATIONAL OFFICE EDUCATION DATA PROCESSING CURRICULUM

by

Betty Peace and Bill Lovelace

North Texas State University
PO Box 13857, NT Station
Denton, TX 76203

June 1984

The research reported herein was performed pursuant to a contract with the Texas Education Agency. Contractors undertaking such projects under Texas Education Agency sponsorship are encouraged to express their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Texas Education Agency position or policy.

TEXAS EDUCATION AGENCY

Department of Occupational
Education and Technology

Research coordinating Unit

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ABSTRACT

UPDATE OF SECONDARY VOCATIONAL OFFICE EDUCATION DATA PROCESSING CURRICULUM

Type of Project: Exemplary
Contract No.: 44420021
Project Title: Update of Secondary Vocational Office Education Curriculum
Organization: Division of Occupational and Vocational Education
North Texas State University
Duration: July 1, 1983 through June 30, 1984
Cost: $27,994

Need/Rationale:

Vocational Office Education Data Processing curriculum and instruction at the secondary level are designed to prepare students for job-entry level occupations in the field of data processing. Due to the rapid changes in high technology which impact all secondary vocational programs, research is needed to determine necessary student and instructor competencies in the area of data processing.

Purpose/Goal:

The objectives of this project were:

(1) To research current literature and the Automatic Data Processing (ADP) industry to determine needs in the field of data processing.

(2) To assess the need for professional development and/or preparation of secondary vocational data processing instructors.

(3) To validate occupational competencies to be acquired by students completing secondary vocational data processing programs.

Procedures:

A review of the literature was conducted for the purposes of (1) Listing and describing the following tasks (a) Review of Literature, (b) Establish and Use a Project Advisory Committee (PAC), (c) Conduct an Assessment of the Professional Preparation and Improvement Needs of Instructors, (d) Prepare a List of Validated Competencies for Developing a Framework for a Curriculum in Data Processing, (e) Prepare and Submit Reports, (f) Maintain External Communications and Coordination, and (g) Evaluate Project. (2) Description of activities to achieve tasks; management plan and timeline; external communications and coordination.

Products/Deliverables:

(1) A list of validated competencies for developing a framework for a curriculum in data processing.

(2) A list of professional development needs of data processing instructors.

(3) State-of-the Art paper. The State-of-the Art paper will also include:
(a) identified needs of business and industry in the field of data processing and
(b) suggestions for:
. modifying materials for use with handicapped students

- promoting equal access in all trade areas
- computer applications in applicable trade areas
- adapting materials for use with students of limited English proficiency (LEP)

4. Quarterly Reports

5. Final Report (100 copies)

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Chapter 1

INTRODUCTION

The National Commission on Excellence in Education ("Commission"), appointed by Secretary of Education Terrel H. Bell stated in its final report; "Excellence characterizes a school or college that sets high expectations and goals for all learners, then tries in every way possible to help students reach them." To a great many educators of public schools, community colleges and other institutions of high education as well as parents, this statement of the "Commission" was assumed to apply only to the back to basics movement and college preparatory programs at the high school level. This assumption is not true. Upon close review of the final report of the "Commission" it is revealed that the "Commission" places a high importance upon vocational education as it does on college preparation in achieving excellence in education. The significance of achieving excellence in education through vocational education in relation to curriculum is revealed in the "Commission's" final report which stated: "Students have migrated from vocational and college-prepartory programs to 'general-track' courses in large numbers."

Achieving quality in the overall educational system by maintaining quality vocational programs in Texas has, for years, been a priority of the Department of Occupational Education and Technology (DOET) of the Texas Education Agency. This commitment of DOET to provide leadership and assistance for achieving "excellence" and/or "quality" programs of vocational education is documented by Goal 3 of the current Five Year State Plan for Vocational Education in Texas. Goal 3 of the Plan (page 63) is to "Provide for the improvement of vocational education through support of research projects, exemplary, and innovative projects, curriculum development projects, vocational education personnel training, activities to overcome sex bias and sex stereotyping, and vocational guidance and counseling programs."

Two of the recommendations made by the "Commission" for achieving excellence in education related specifically to the improvement of the curriculum and the preparation and improvement of teachers. For the improvement of curriculum the commission stated: "whatever the student's educational or work objectives, knowledge of New Basics is the foundation of success for the after-school years, ... 'and' the high-school curriculum should also provide students with programs requiring rigorous effort in subjects that advance students' personal, educational, and occupational goals, such as the fine and performing acts and vocational education."

In making its recommendation, the "Commission" recognized the need for the continous updating of curriculum. This emphasis of updating the curriculum with the assistance of business, industry was evidenced by their statements: "We applaud the consortia of educators and scientific, industrial, and scholarly societies that cooperate to improve the school curriculum." and "New instructional materials should reflect the most current applications of technology in appropriate curriculum areas, the best scholarship in each discipline, and research in learning and teaching."

The "Commission" also supported the reality of teachers being able to demonstrate competency both in teaching skills and the subject which they are teaching. This was evidenced by their recommendation "1. Persons preparing to teach should be required to meet high educational standards, to demonstrate an aptitude for teaching, and to demonstrate competence in an academic discipline."

Concurrently with the national move for excellence in education, the Texas Legislature has taken steps to improve and achieve excellence in the public schools of Texas by mandate. Legislation was passed for the improvement of teacher performance and improvement of curriculum.

State level emphasis in Texas on improving teacher education by curriculum developed on the basis of teacher competencies began in 1972, when the state

Board of Education recommended competency-based teacher education for all institutions in Texas with approved teacher education programs. Minutes of the Texas State Board of Education, June 10, 1972, revealed that it was the opinion of the Board that institutions of higher education in Texas with approved teacher education programs should determine what competencies should be developed by potential teachers and provide instructional activities that would develop the determined competencies.

This emphasis on improving the quality of secondary public school teachers was revived in Texas when the sixty-seventh Texas Legislature passed S.B. 50 entitled, "An act relating to the competency and certification of public school teachers." This Bill provides for sweeping changes in teacher education in Texas. Section 3e of the Bill refers to the issuance of an initial certificate or renewal of an existing certificate as follows: "The State Board of Education by rule shall require satisfactory performance on a competency test prescribed by the Board as a condition to admission into an approved teacher education program. In addition, the Board by rule shall require satisfactory performance after graduation on a competency test prescribed by the Board as a condition to full certification as a teacher.

The competency test to be prescribed by the State Board for teachers of occupational (vocational) subjects has been a concern of a great number of vocational educators. This concern has increased since there has not been any indication from the state level competency tests will be the same for vocational and non-vocational teachers.

It is generally agreed that preservice teacher education curriculum may be divided into three basic areas: subject matter education (content), general education, and professional education (pedagogy). In most cases, with the exception of vocational agriculture and vocational homemaking, the approval of vocational-technical teachers in Texas had been based on the

evaluation of the "successful" work experiences in the occupation which they were to teach. The evaluation of the work experiences in the occupation (vocational subject matter to be taught) has been done basically by reviewing each individual's written resume of wage earning experiences. In view of this approval process, it has become evident that the competency test prescribed by the State Board for use in certifying vocational teachers must include competencies of subject matter content (occupational skills and knowledge). The inclusion of the occupational competencies in the competency test prescribed by the Board is supported by a statement made in a letter to one of his constituents by a co-author of S.B.5.0. which stated:

> In my opinion the Legislature intended to include vocational teachers within the certification coverage of SB-50. The definition of "competency" would include occupational competencies of subject taught. The testing procedure for vocational teachers who have not completed an approved bachelors degree program, however, does not necessarily have to be identical to the procedure used to test teachers who have completed an approved program. Because some vocational teachers have obtained their positions as a result of their experience, they should not be required to take a standardized test.
>
> The Texas Education Agency is currently devising alternative tests for vocational teachers. Implementation of these tests will not occur for some time, however.

Based on the above information, it is apparent that vocational teachers should, as a requisite to certification, demonstrate satisfactory performance on a test which includes both professional (pedogogical) and occupational (subject matter) competencies.

The other legislative action to improve education in the Texas public schools which mandated curriculum reform was House Bill 246. This legislation repealed all previous laws requiring courses or subjects to be taught in the public schools and established twelve subject areas that are anticipated to constitute a well balanced curriculum for kindergarten through grade twelve. The subject areas are:

(1) English language arts; (2) other languages, to the extent

possible; (3) mathematics; (4) science; (5) health; (6) physical education; (7) fine arts; (8) social studies (9) economics, with emphasis on the free enterprise system and its benefits; (10) business education; and (12) Texas and United States history as individual subjects and in reading courses.

SIGNIFICANCE OF THE PROJECT

The mandates of the Texas Legislature in relation to teacher certification and improvement of the Public School curriculum and the rapid changes in high technology dictate the need for modifications in the curriculum used for the preparation of teachers and the curriculum of secondary data processing programs.

The first step in planning for the development of modification of a curriculum or instructional program is to analyze the requirements of the system that will use the products of the program or curriculum. A review of the literature reveals that an analysis of the system requirements for secondary data processing programs has identified two specific components of the program--instructors and curriculum--which must be improved to meet the mandates of the Legislature and the advances of high technology. A review of these two components have identified specific requirements. These two requirements of the instructional system are: (1) A listing and description of competencies needed by secondary students in data processing programs and (2) the identification of competencies needed by data processing instructors.

To meet these two specified requirements of the instructional system, analysis of the requirements have resulted in the formulation of three objectives for meeting the mandates of S.B. 50 and H.B. 246.

OBJECTIVES

The overall purpose of this study was to develop a description of competencies needed by students completing secondary data processing programs and to identify competencies needed by data processing instructors. The objectives of this study were to:

(1) To research current literature and the Automatic Data Processing (ADP)

industry to determine needs in field of data processing.

(2) To assess the need for professional development and/or preparation of secondary vocational data processing instructors.

(3) To validate occupational competencies to be acquired by students completing secondary vocational data processing programs.

CHAPTER II

PROCEDURES

The findings of this study will ultimately result in the revision of the curriculum or process of certifying and upgrading of instructors of secondary data processing programs and the revision of the curriculum and instructional materials used in conducting data processing programs in the public secondary schools [illegible]. Since the purpose of this study was to identify competencies of both teachers and students which would provide data essential for curriculum development, the "Design of Instructional Systems Development" being used by vocational curriculum development specialists was selected as a model for procedures used in this study. The model from which the procedures for this study were developed is described in the following narrative and in Figure 1.

The first step in planning and developing an instructional program is the analysis of the requirements of the system that will use the products of the program. This analysis is essential since the functions performed by the employees are created by the requirements of the employing system.

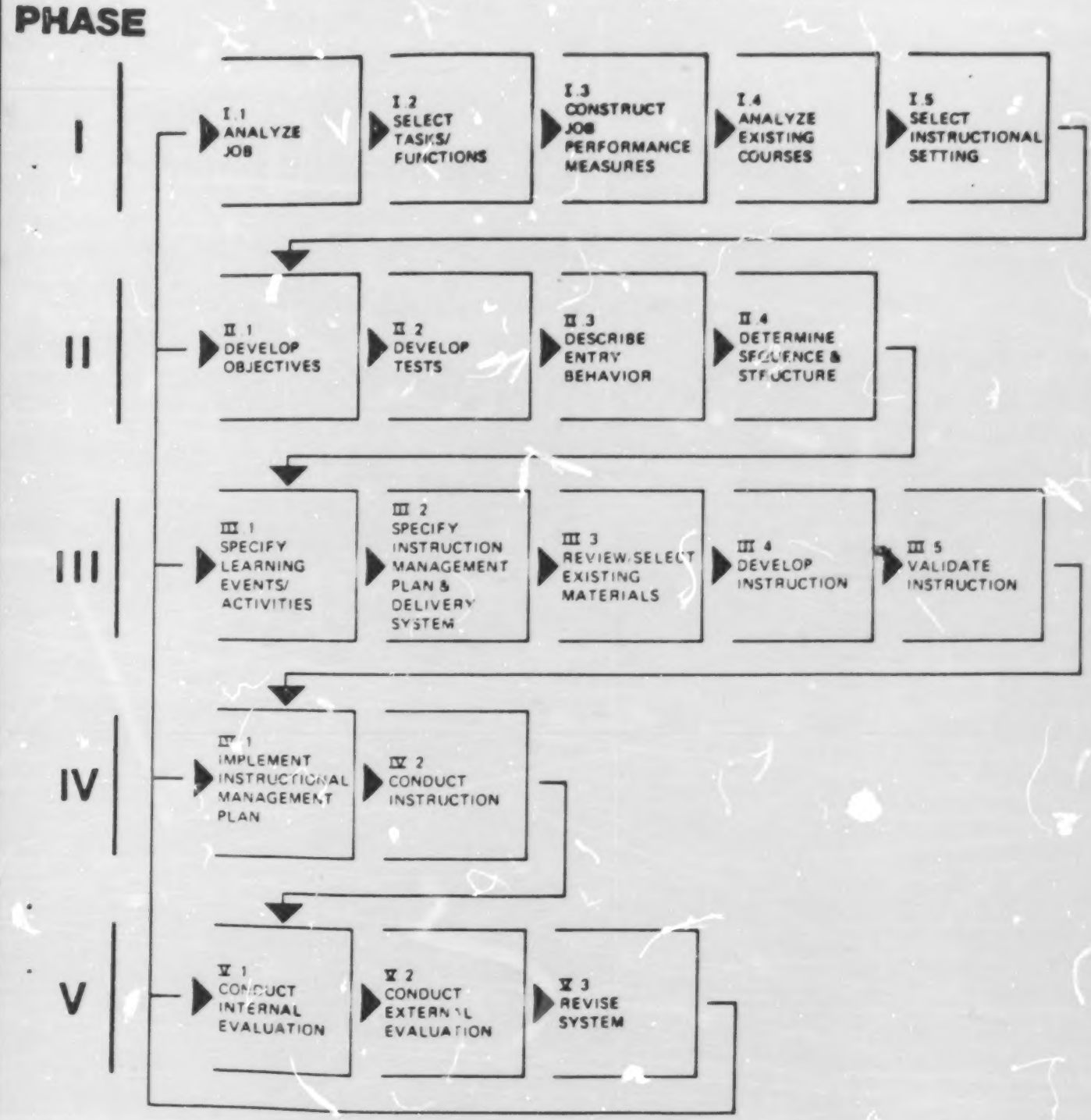
An analysis is made to obtain data to describe the system:

1. Its purpose or objective;
2. The worker functions required to achieve the objective;
3. The employees responsibilities in the system;
4. The components or subsystem within the system;
5. Materials and equipment required to the support system;
6. Established procedures for operation of the system; and
7. The effects of environmental factors on operation and maintenance of the system.

The basis for planning and developing a curriculum for the system is the tasks performed in operating, maintaining, and supporting that system. The personnel of the system forms the starting point for identifying job performance requirements and standards. The analysis of the occupation or business system

FIGURE 1.

Instructional System Development



Phase I: Analyze
Phase II: Design
Phase III: Develop
Phase IV: Implement
Phase V: Control

(U.S. Airforce 350-30)

will provide developmental data for:

1. Performance and design requirements;
2. System equipment and personnel functions;
3. Equipment and facilities required to support system operation and maintenance;
4. Human (job) performance requirements; and
5. Personnel, training, training equipment, and technical requirements.

Planning data needed by the developer which will be provided by the analysis includes data for:

1. Stating purpose or objective of system (business/industry or public school);
2. Identification of user (business/industry or public school); and
3. Management responsibilities of user.

The accurate identification of the human tasks that are required to operate, maintain, and support the system is vital to the planning and development of the training program. The tasks performed by the workers in the system are the job performance requirements of the system. The job performance requirements are obtained from a job inventory of tasks. Defining the job performance requirements or competencies provide specifications of:

1. **WHAT** is to be done;
2. **WHY** it is to be done;
3. **WHEN** it is to be done;
4. **WHERE** it is to be done;
5. **WHO** is to do it;
6. **HOW** it is to be done; and
7. **HOW WELL** it is to be done.

Every effort must be made to insure that the documentation of job requirement data is provided for the developers of the curriculum used in preparing personnel for the system. In some cases the system may be hardware oriented. Therefore, a

job requirements worksheet may be used. Some may refer to this as task analysis worksheet. Regardless of the heading used on the worksheet it provides documentation of the job requirement data. The worksheet includes the following types of data:

1. List all tasks required by the worker to carry out the assigned job(s);
2. List all equipment needed to carry out task;
3. List all materials needed for completion of task;
4. Description of the physical environment such as classroom, laboratory, or industry site; and
5. Identification of the source(s) of information for task taken.

The analysis of the job requirements will provide data for:

1. Determining qualitative and quantitative requirements for improvement and/or preparation of personnel;
2. Translating duty and task data into instructional objectives, instructional standards, and criterion-referenced evaluation; and
3. Continous updating of job requirements;

Updating of job requirements is needed in order to:

1. Identify all tasks, equipment, and materials needed to do the job;
2. List the conditions under which the tasks are to be performed; and
3. Emphasize unique duties and tasks to describe the nature of the work.

Following the determination of the job requirements for the personnel to be trained, the next step in the system is to define the education or training requirements. This is necessary in order to make the decision of what is to be taught in the system, and what is the content of the curriculum. By defining the training requirements the decision makers will be able to:

1. Develop instructional standards;
2. Select method(s) for preparing workers (or teachers);
3. Identify factors affecting selected methods; and
4. Identify resources.

The instructional standards are used to standardize and control training

The standards list, by means of task and knowledge statements, identifies instruction needed to prepare personnel for job performance. This listing of instructional standards (competencies) is used to:

1. Develop formal courses;
2. Prepare learning objectives, instructional materials, and evaluation criterion;
3. Establish internships and practicums; and
4. Perform follow-up on trainees.

The instructional standards are developed by:

1. Identifying quantitative requirements including
   A. Personnel performing the task; and
   B. Relative importance of the task.
2. Determining qualitative requirements such as
   A. Frequency of task performance;
   B. Learning difficulty;
   C. Interval between training and use; and
   D. Prior experiences of trainees.

The course(s) of instruction is developed with objectives based directly on the task analysis and knowledge statements derived from the job performance requirements which have been incorporated in the instructional standards. The process by which the task statements in the instructional standards are translated into instructional objectives is that of instructional analysis. Tasks and subtasks are examined during this process from an instructional position to provide the following information:

1. Principles and theory necessary for the transfer of training;
2. Necessity of prerequisite knowledge in other areas;
3. Attitudes necessary for future performance by learners;
4. Terminology unique to instruction and learning;
5. Equipment, tools, and materials essential to instruction and learning;

and

6. Teaching tactics complementary to behavior being taught.

The process of grouping and examining for commonality the information obtained from instructional analysis allows for the translation of job requirements (or competencies) into instructional objectives with evaluation criteria. Further, instructional analysis provides information as to the techniques or tactics most effective in the instructional situation as well as the minimum instructional equipment, tools, or materials necessary.

After the instructional analysis has been completed, the developer can proceed to the writing of behavioral objectives in terms of what a student must know and do.

From the instructional analysis the behavioral objectives are identified and written as criterion objectives or as enabling objectives. The task/knowledge statements may be composed of both criterion and enabling objectives. In addition, based on the level of difficulty, what is criterion objective in one sequence of instruction may become an enabling objective in another sequence. Therefore, there is support for the concept that both types of objectives should be criterion referenced; or in other words, they should be written in performance terms for instructional purposes. The performance or criterion referenced objective will be written with the conditions and standards specifically stated that will be used for measuring the achievement of the objective. Following the writing of the performance (criterion referenced) objectives the development of the curricula and materials follows the usual procedure of course development.

The remaining decisions to be made for implementation of the instructional program include:

1. Facilities;
2. Materials and equipment;
3. Personnel;

4. Funding;
5. Formal courses of instruction including:
   Existing courses,
   Revised courses,
   New courses;
6. Workshops and institutes;
7. Cooperative internship or practicums;
8. Number of personnel to be prepared;
9. Time requirement;
10. Availability of qualified trainers (instructors)
11. Equipment and facilities;
12. Availability of data;
13. Institutional requirements; and
14. Costs.

This design will provide any public school or teacher training institution the opportunity to develop and conduct a training program designed to meet the specific needs of systems they serve. A training program which would be developed using the processes - tasks-functions needed by the workers of the specific employer and the area where the trainees are to be employed.

An analysis of the three objectives of the study and the model resulted in the following tasks being selected is the procedures to be performed in completion of the study:

1. Review of Literature.
2. Establish and use a Project Advisory
3. Conduct an Assessment of the Professional Preparation and Improvement Needs of Instructors.
4. Prepare a List of Validated Competencies for Developing a Framework for a Curriculum in Data Processing.
5. Prepare and Submit Reports

REVIEW OF LITERATURE

The review of the literature was completed for the purposes of (1) determining the state-of-the-art for secondary vocational data processing programs; (2) developing a list of competency/knowledge statements essential to the preparation and/or professional development of secondary data processing instructors; (3) identifying occupational competencies needed by students completing secondary vocational data processing programs; (4) identifying job opportunities available to students completing secondary vocational data processing programs; and (5) the identification of suggestions for modifying materials for use with handicapped students, promoting equal access, computer applications, and adapting materials for use with students of limited English proficiency.

The review of the literature consisted of documents prepared by the Department of Occupational Education and Technology (DOET), Texas Education Agency or reports resulting from studies sponsored by the DOET, Federal and State financed vocational curriculum centers, related literature of training and research departments of the U.S. Air Force, and documents listed in ERIC. Examples of the literature reviewed are presented at the end of this chapter.

ESTABLISH AND USE A PROJECT ADVISORY COMMITTEE

In order to involve and obtain expertise from other organizations, business and industry, and the Texas Education Agency, a Project Advisory Committee was established and used. Linkages for input to the project are essential with representatives of organizations that are involved in the preparation and employment of trainees in data processing.

The Project Advisory Committee (PAC) members served three major roles in the project: (1) as an advisory body to the project staff in the review of the project products and sub-products; (2) served as reviewers and made

recommendations for (a) finalization of the list of knowledge and competency statements used in conducting the professional needs assessment described in task 3, and (b) finalization of the list of occupational competencies to be acquired by students completing secondary vocational data processing programs; and (3) as external evaluators of the project.

The PAC Members were representative of agencies and organizations who should provide input to the project. The following list indicates the agencies, organizations, and institutions who were involved in the preparation and consumers of the product (students of secondary data processing programs) to be served by the project and therefore whose representation on the PAC was essential:

(1) State Director of Vocational Office Education;

(2) Vocational Teacher Educator;

(3) Two Secondary Vocational Data Processing Instructors

(4) Two Representatives from Business and Industry;

(5) Director of Vocational Curriculum Laboratory; and

(6) Commission on Standards for the Teaching Profession.

Each member of the PAC was selected based on: (1) their knowledge and responsibility as related to each objective to be achieved; and (2) their background and/or leadership in relation to each of the products/deliverables to be produced by the project.

The PAC was convened for a one day meeting at the Executive Inn in Dallas, Texas on September 21, 1983. The purpose of this meeting was for the purposes of:

(1) Making them aware of the project and project objectives.

(2) Providing them a report on literature reviewed with opportunities for interaction.

(3) Obtaining recommendations for finalization of the "lists."

(4) Describing procedures for obtaining their input.

(5) Suggesting due dates for their inputs and finalizing of the "lists."

Following the one day meeting in Dallas, all communications with the PAC membership was conducted by mail or telephone. Specific activities of the PAC are described in the narrative of each of the other tasks performed in completion of this project.

ASSESSMENT OF THE PROFESSIONAL NEEDS OF INSTRUCTORS

The findings of the review of literature was synthesized and a list of knowledge/competency statements of pedagogy was developed. This list was reviewed and revised by a sub-committee of the PAC at the one day meeting in Dallas. The revised list of statements were placed on a questionnaire for conducting a modified Delphi study.

The modified Delphi technique was used to elicit and refine the advisory committee members' judgements in identifying the lists of competencies/knowledge statements to be used in the professional needs assessment. The Delphi technique involves obtaining individuals' reactions by mail to specific questions or statements, combining these reactions, and again asking these individuals to review and rank the findings until a priority ranking has been determined.

The Delphi technique is based on the group opinion and consists of three features that serve to alleviate the major difficulties of the traditional face-to-face discussion. Dalkey[1] listed these features as follows:

(1) Anonymity which prevents the influence of dominant individuals which might arise in a group situation.

(2) Controlled feedback which reduces the confusion and interference in communication which occur in a group situation.

(3) Statistical group response which reduces the group pressure for conformity which might occur in a group situation and serves to assure the final response of every group member represented.

[1] Dalkey, N. C., 1969, The Delphi Method: An Experimental Study of Group Opinion. Memorandum RM-5888-PR, Santa Monica, California: RAND Corportion.

The Delphi technique as a means of collecting data was developed by Dalkey and Helmer during the mid 1950's while they were working with the RAND Corporation. The idea for the technique surfaced as the researchers noted the necessity of developing a method of soliciting group opinion with reliable results for the purpose of forecasting future developments or events. The Delphi technique for data collection became popular during the 1960's when many corporations became conscious of the need for long-range planning. Dalkey[2] emphasized some of the advantages of the Delphi technique by stating:

> There are several properties of a Delphi exercise that should be pointed out. The procedure is, above all, a rapid and relatively efficient way to "cream the top off the heads" of a group of knowledgeable people. In general, it involves much less effort for a participant to respond to a well-designed questionnaire than, for example, to participate in a conference or to write a paper. A Delphi exercise, properly managed, can be a highly motivating environment for respondents. The feedback, if the group of experts involved is mutually self-respecting, can be novel and interesting to all. The use of systematic procedures lends an air of objectivity to the outcome that may or may not be spurious, but which is at least reassuring. And finally, anonymity and group response allow a sharing of responsibility that is refreshing and that releases from the respondent's inhibitions.

Helmer[3] suggested that the Delphi technique might be utilized to determine the expected needs of educational reform in the present society as well as to establish the future educational needs. Numerous reports on the use of the Delphi technique in education have been made[4] as indicated below:

> In one instance, a college designed an entire new branch campus through concensus Delphi, including staffing, curriculum and facilities. In another recent case, five state colleges and universities banded together to use Delphi to obtain a consensus profile on their constituent groups, including the public. In yet another instance, the characteristics of a good teacher were elicited from among faculty, administration, students, and alumni; the results became part of the evaluation criteria for tenure. In addition to its utilization in forecasting, Delphi has been an important tool in articulating objectives, in determining solid evaluative criteria, in conducting cost-effectiveness studies, and the design of programs and facilities.

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[2]Ibid.

[3]Helmer, Olaf, 1966, Social Technology. New York: Basic Books, Inc.

[4]Benning, Dennis, Cochran, Samuel, and Benjamin Donatilli, 1972, Delphi Panel to Explore Postsecondary Educational Needs in the State of New Hampshire. Manchester, New Hampshire: Decision Research, Inc.

During the process of developing a design for this proposal, it was noted that in order to insure a maximum amount of participation on the part of the advisory committee, yet the design had to extract from the advisory committee members a maximum amount of information relevant to the project. The Delphi technique for data collection was selected because it offered the following advantages, as indicated by Canup[5]:

(1) Delphi allows for a minimum amount of time for panelists to review the information presented.

(2) Delphi allows for an open-ended questionnaire in order to permit the panelists to add information they believe to have been omitted from the initial list.

(3) Delphi enables the panelists to review the group statistical response with respect to and apart from their own perceptions.

(4) Delphi enables the panelists to reexamine their previous position and to change their opinion without having to justify their change to any member of the group.

(5) Delphi offers a methodology proven to be at least as effective as face-to-face discussions and generally more effective.

The standard Delphi procedure utilizes three questionnaires as follows:

(1) An open-ended questionnaire (Questionnaire I) is administered calling for a response of opinions or ideas involving panelists' judgements.

(2) A second questionnaire (Questionnaire II) is constructed from the panelists' statements on the first questionnaire. Questionnaire II is a Likert-type scale, and panelists rate each of the statements received in Questionnaire I.

(3) Using the responses from Questionnaire II, a median and interquartile range are computed for each statement. In Questionnaire III, these values for the group, along with the panelists' round two responses, are returned, and the panelists are asked to reconsider the round two responses and make any necessary revisions.

The purpose of Questionnaire I was to solicit the perceptions of the Panel of Experts. However, the time required by the panelists to complete an open-ended

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[5]Canup, C. R. Jr., 1975, "A study of the Competencies Needed by Chief Administrators of Public, Two-Year, Postsecondary Educational Institutions as Perceived by Local Chief Administrators Within the South Carolina System of Technical Education." Unpublished Doctoral dissertation, North Carolina State University.

questionnaire is considerable. Therefore, the Delphi technique for this study was modified by developing a checklist of competencies and knowledges for Questionnaire I. Space was provided in Questionnaire I for additional items members responded to only two rounds of questionnaires. The format for the questionnaire is presented in Appendix B.

A questionnaire (Questionnaire I) was administered containing a list of competencies and knowledges extracted from a review of the literature. Each advisory committee member was asked to evaluate each competency and knowledge as whether he/she agreed or disagreed with the item. A Likert-type scale of one (disagree) to seven (agree) indicated either the disagreement or agreement of an item. A copy of the questionnaire used for the modified Delphi technique is presented in Appendix A.

An advisory committee member's agreement that the statement was needed by staff for conducting vocational data processing instructional programs was indicated by circling the number seven. If the advisory committee member disagreed that the statement was necessary for data processing instructors, the number one was circled. Circling the number four indicated that the statement was about as important as unimportant; circling any other numbers (two, three, five, six) indicated respectively increasing levels of agreement or disagreement with the statement depending upon the direction of the advisory committee member's feelings. Space was provided for advisory committee members to include any additional statements they considered as necessary. The degree of agreement or disagreement was indicated for each additional statement by the advisory committee member circling the appropriate number on the Likert-type scale.

The open-ended responses generated from Questionnaire I were edited so as to be similar in format to the closed-ended statements. The advisory committee members' responses were tabulated in the form of the median and interquartile range computed for each statement.

Questionnaire II was identical to Questionnaire I with the exception being the addition of the median and interquartile range as computed from the responses to Questionnaire I as well and the edited open-ended statements. Each advisory committee member was asked to reconsider each item in Questionnaire II in relation to the median and interquartile range of the total advisory committee. Thus, the purpose of Questionnaire II was to bring about a convergence of opinion among the advisory committee members by informing them of the other members' responses. The median and interquartile range was computed for each statement contained in Questionnaire II.

The median (Q_2) and the interquartile range (Q_1-Q_3) was computed for each statement in Questionnaire I. The quartile interval, Q_1-Q_3, identified the middle 50 percent of the responses. The size of Q_1-Q_3 indicates the degree of consensus reached among advisory committee members for a statement. The smaller the quartile interval, the greater the degree of consensus reached. The purpose of the statistical treatment for Questionnaire I was to allow all participants to view the responses of the other participants in order to reach consensus concerning the competencies and knowledges of pedagogy needed by staff to conduct vocational educational instructional programs.

The median and interquartile range was computed for Questionnaire II. Any item reaching an interquartile range of 1.99 or less and having a median of 5.00 or higher was considered as necessary competencies and knowledges. The following operational definitions were adapted, patterned after those used by Benning, Cochran, and Donatelli[6]:

(1) Interquartile Range (measure of consensus)

a. 0.00 - 0.99--Highest consensus

b. 1.00 - 1.49--Very high consensus

[6] Benning, Dennis, Cochran, Samuel, and Benjamin Donatelli, 1972, Delphi Panel to Explore Postsecondary Educational Needs in the State of New Hampshire. Manchester, New Hampshire: Decision Research, Inc.

c. 1.50 - 1.99--High consensus

d. 2.00 - 2.99--Moderate consensus

e. 3.00 - 7.00--Negligible consensus.

(2) Median (measure of agreement of likelihood)

a. 1.00 - 2.99--High disagreement

b. 3.00 - 4.99--Negligible agreement

c. 5.00 - 7.00--High agreement.

All of the items (knowledge competency statements) on the Questionnaire having a median of 5.0 or higher were included on the professional needs assessment survey instrument. The survey instrument presented in Appendix B, was mailed to instructors of secondary vocational office data processing programs.

A computer program previously designed and tested for reliability was used to calculate a need index for each of the 196 knowledge / competency statements on the survey instrument. The difference between actual performance level was subtracted from the desired performance level to obtain the need index. For example, if on competency/knowledge statement one, a person ranked their present performance ability as two (actual) with their desired performance level (desired) as four, the data analysis would list a need index of two for the statement. The need index was then adjusted by the magnitude of the respondents' identified desired performance level.

The list of professional development needs with the need index for each knowledge/competency statement is presented in Chapter III, "Project Products" of this report. The list of subject matter (occupational competencies) which instructors of data processing programs should be able to demonstrate are the same as those which should be acquired by students completing the program. This list is also presented in Chapter III of this Report.

Objective 2 "To assess the professional development and/or preparation of secondary vocational data processing instructors" was achieved by completion of

this task.

VALIDATION OF OCCUPATIONAL COMPETENCIES

An initial list of competencies for data processing was developed from an initial review of literature. The initial review of literature identified 399 separate tasks which were being performed by workers in the field of business data processing. The 399 tasks were finally grouped into a list of 110 competency statements. This list of competencies was presented to the secondary data processing instructors attending the summer workshop for vocational office education teachers in San Antonio, Texas during August 1 - 4, 1983. The miteal list of competencies were presented to the instructors as a "job inventory" of competencies for data processing programs of computer operator (CIP 07.0302), business data entry peripherial equipment operations (CIP 07.0304), computer programer (CIP 07.6305) and business data processing and related (CIP 07.0399). Each of the instructors were requested to check each of the competencies listed under the headings of "Check if taught now" and "check if to be included in revised curriculum." The job inventory survey is presented in Appendix C.

The responses of the instructors were compiled and a second list of competencies was developed. In developing the second list of occupational competencies, an attempt was made to place the competencies under categories of the Code of Instructional Programs (CIP) with specific job titles. The job titles by CIP category were taken from the Third Edition of Vocational Preparation and Occupations prepared under the sponsorship of the U.S. Department of Education.

The second list of occupational competencies was presented to a sub-committee of the PAC for review and updating. The sub-committee was also provided with a draft of the essential elements for data processing which had been prepared by the Texas Education Agency in response to H. B. 246. The second list of occupational competencies is presented in Appendix D.

After reviewing the second list of occupational competencies and the draft of the essential elements, the sub-committee was charged with the responsibility of developing a list of competencies performed by workers in occupations for which instruction was provided under CIP's 07.0302, 07.0303, 07.0304, 07.0305, and 07.0306.

The development of the third list of occupational competencies for secondary data processing was completed by an analysis of each competency, knowledge, task, element, and descriptor statements found in the materials provided. Each statement was carefully analyzed by each member of the sub-committee and was left or removed from the list by vote. If any single member felt that a statement should be included in the final list, then the statement was included.

The sub-committee recommended that CIP 07.0306 (System Analyst) be removed from the programs being analyzed due to the educational attainment needed as a prerequisite for a trainee to benefit from instruction.

The list of occupational competencies developed by the sub-committee of the PAC was placed on a questionnaire for determining consensus using the modified Delphi technique which has been described previously in this report. A copy of the questionnaire is presented in Appendix E.

The occupational competencies (competencies to be acquired by completers of data processing programs) which remained on the list following the use of the Delphi technique were placed on a Data Processing Competency Inventory for validation. See Appendix F for an example of the inventory.

The list of occupational competencies (subject matter) finalized by the PAC members was validated for the purposes of: (1) identifying occupational competencies needed in qualifying secondary data processing instructors for entry into certification courses and (2) validating competencies to be acquired by students in secondary data processing programs.

The task inventory procedure used in the Instructional systems Design developed by the U.S. Air Force was used in validating the tasks or occupational competencies. The task inventory method of identifying and validating competencies collects data directly from individuals who are performing the job.

To check the reliability of the task inventory method, several studies have been conducted. One of the studies conducted compared worker and supervisor responses to an inventory of 479 task statements. Supervisors and workers were divided into ninety-four pairs with the workers checking the tasks which they felt the workers performed. Analysis of the responses by workers and supervisors resulted in the following conclusions reported by Hazel, Madden, and Christal[7]:

(1) When compared to supervisors' estimates, there was no tendency for workers to exaggerate the number of difficulty of tasks they perform.

(2) Task performance agreement defined by two indexes was higher than time-spent agreement at the task level.

(3) Supervisors show higher agreement with workers on a broader or more general work level (i.e., duties), than on a more specific work level (i.e., tasks). For example, supervisor-worker agreement concerning distribution of incumbent's work time was 48 percent at the task level and 73 percent at the duty level.

(4) With regard to supervisor-worker agreement on task performance, it appears that the level of agreement depends on the index used to measure agreement. Agreement on task performance was higher when computed in terms of performance or nonperformance of all tasks on the inventory (90%), than when it was computed in terms of only those tasks checked by the worker or his supervisor (57%).

(5) For the specialty investigated, the generally moderate agreement (or disagreement) found between supervisors and workers concerning the nature of the worker's job suggests that a supervisor may not know precisely what any one subordinate does task by task. Since there was no tendency for workers to exaggerate the number or difficulty of tasks performed, the current task inventory procedure of collecting job information directly from workers seems preferable to collection of job information from supervisors.

Another study was conducted to determine the stability of data computed from job inventory survey returns and reported in consolidated job descriptions. The

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[7]Hazel, J. T., Joseph M. Madden, and Raymond E. Christal. March, 1964. "Agreement Between Worker-Supervisor Description of the Workers Job," Journal of Industrial Psychology, 2:71-79.

study was conducted by using ten previously surveyed career ladders. The cases or groupings of jobs in each career ladder were randomly divided into halves. Job descriptions were computed for each of the half samples and the percentage performing and percentage of time spent by total group vectors for each pair of job descriptions were correlated. Christal[8] reported the following results:

> It was found that the vectors "percent performing" and "percent time spent by the total group" are highly stable, even for relatively small samples. Split-half reliability coefficients were generally in the middle and upper 90's.

It is concluded from the preceding studies that the job inventory method is a very feasible approach for collecting work-task information from large numbers at less cost than observation and interview methods.

When the question was asked, "Can workers be trusted to be thorough and completely honest when they fill out job inventories?" Christal[9] answered:

> Studies have been conducted concerning this question, and I can say that the answer is definitely "Yes," at least as far as workers in the Air Force are concerned. We know that when a worker fills out an inventory on two occasions, he gives essentially the same information both times. Split-half reliabilities for information such as the percent of workers performing various tasks run from .95 to .99. Supervisors agree with the information provided by their subordinates. Information collected with daily work records is consistent with information collected with inventories. Workers do not inflate their job descriptions in terms of the the number and difficulty levels of tasks they report. The work tasks reported by individuals are consistent with the information they provide in the background section concerning tools utilized and equipment worked on.

The process of operational validation identified: (1) the competencies needed by instructors to teach data processing programs and (2) the competencies which should be acquired by students secondary vocational data processing programs.

Four members of the Project Advisory Committee agreed to select five persons who were employed in data processing jobs to complete the data processing

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[8]Christal, Raymond E., 1971. Stability of Consolidated Job Descriptions Based on Task Inventory Survey Information. San Antonio, Texas: Brooks Air Force Base.

[9]Christal, Raymond E., 1973. "The United States Air Force Occupational Research Project" Paper presented at the Symposium, The State-of-the-Art in Occupational Research and Development, Navy Personnel Research and Development, San Diego, California, July 10-12.

inventory survey instrument. The responses obtained by the survey were entered into a computer for analysis and generation of a validated list of competencies.

The identification and validation of competencies in the field of secondary data processing was limited to job titles which have been identified by the Texas Employment Commission in the publication Texas Occupational Demand Forecast 198[illegible]

Below are the job titles included in this study by: (1) Code of Instructional Program (CIP); (2) Dictionary of Occupational Titles (DOT); and (3) Texas Occupational Employment Statistics (OES) Survey Code.

CIP: 07.302 Business Computer and Console Operation

DOT Code	Title	OES Code
213.362-010	Computer Operator	61105

CIP: 07.0303 Business Data Entry Equipment Operation

DOT Code	Title	OES Code
203.362-014	In-File Operator	61336
203.362-018	Terminal System Operator	61392
203.382-018	Magnetic-Tape-Composer Operator	61107*
203.582-018	Cryptographic-Machine Operator	61392
203.582-022	Data Typist	61107*
203.582-026	Data-Codes Operator	61107*
203.582-030	Keypunch Operator	61107*
203.582-070	Verifier Operator	61107*
206.387-030	Tape Librarian	61330**
221.367-046	Mill Recorder, Computerized Mill	62003

* ALL reported as key-punch operators (data entry).
** Listed as "File Clerks"by OES.

CIP: 07.0304 Business Data Peripheral Equipment Operation

DOT Code	Title	OES Code
213.382-010	Computer-Peripheral Equipment Operator	61109
213.685-010	Auxiliary-Equipment Operator, Data Processing	61109
213.782-010	Tabulating-Machine Operator	61113

CIP: 07.0304 Business Data Peripheral Equipment Operation

DOT Code	Title	OES Code
213.382-010	Computer-Peripheral Equipment Operator	61109
213.685-010	Auxiliary-Equipment Operator, Data Processing	61109
213.782-010	Tabulating-Machine Operator	61113

CIP: 07.0305 Business Data Programming

DOT Code	Title	OES Code
219.367-026	Programer Detail	31001*

*coded as 31001 by the Third Edition of Vocational Preparation and Occupations (UPO) and as 31000 by the Texas Employment Commission.

A catalog list of the validated competencies to be acquired by students completing secondary data processing programs is presented in Chapter III, "Project Products" of this report.

PROJECT EVALUATION

The project and a draft of the Final Report were evaluated by: (1) members of the Project Advisory Committee; (2) representatives of the Department of Occupational Education and Technology, Texas Education Agency. The responses to the questionnaire used in the evaluation were positive. The questionnaires used for the evaluation are presented in Appendix G. Comments of the respondent evaluators are presented in Appendix H.

EXAMPLES OF LITERATURE REVIEWED

Title	Principal Author or Publisher
Final Report Secondary School Data Processing Program Research Project	Sharon L. Brown University of Houston
Identification and Analysis of Emerging Occupations In Vocational Office Education	Ken Hogue, Texas A & M University
Business Data Processing Occupational Performance Survey	Sidney D. Borcher, The Center for Vocational and Technical Education
Occupational Survey Report Computer Operations and Programming Specialties	USAF Occupational Measurement Centers, Randolph Air Force Base
Texas Occupational Demand Forecast 1985	Texas Employment Commission
Fourth Edition Dictionary of Occupational Titles	U.S. Department of Labor
A Classification of Instructional Programs for Occupational Education and Technology	Texas Education Agency
Selected Characteristics of Occupations	U.S. Department of Labor
Exploring Careers	U.S. Department of Labor
Competency Profiles for Data Processing	Oklahoma State Department of Education
Competency Record and Instructional Tasks Listing for (1) Data Entry Operator, (2) Business Computer Programmer, and (3) Computer and Console Operator.	Minnesota State Department of Education
A Classification of Instructional Programs	National Center for Education Statistics, U.S. Department of Education
Third Edition of Vocational Preparation and Occupations	National Occupational Information Coordinating

Examples of Literature

Reviewed
(Cont.d)

	Committee. U.S. Department of Education
Performance Objectives and Occupation Analysis of: (1) Computer Programmer (business Programmer); (2) Data Entry Operator; and (3) Console Operator	Business and Office Education Unit, Occupational Education Division, Colorado State Board for Community Colleges and Occupational Education
DPMA Model Curriculum For Undergraduate Computer Information Systems Education	Education Foundation Data Processing Management Association, Pack Ridge, Illinois
Course Outlines for Office Data Processing Programs	Bill Young, Dallas I.S.D. Dallas, Texas
An Analysis of Reports on the Status of Education In America: Findings, Recommendations, and Implications	Davidson, Jack L. and Montgomery, Margart, Tyler I.S.D., Tyler, Texas
Handbook For Analyzing Jobs	U.S. Department of Labor
Task Inventory For Business Data Processing and Related Programs	Elaine R. Burrow, East Texas State University
State Board of Education Curriculum Rules. GE 4-450-01	Texas Education Agency

CHAPTER III

PROJECT PRODUCTS

The products to be developed as a result of this project as specified by RFP-R05 were: (1) a list of validated competencies for developing a framework for a curriculum in data processing (10 copies); (2) a list of professional development needs of data processing instructors (10 copies); and (3) ten copies of all materials resulting from the project. The only other final deliverable produced by the project which was specified in RFP-R05 is a state-of-the art paper on secondary data processing programs in Texas public schools. This section of the report provides a description of each of the three products produced by the project.

PROJECT OPERATIONAL DEFINITIONS

For the reader to have a better understanding of the description of the project products it is necessary that the definition of terms, as used in this report, be presented prior to the description of the products produced.

Competency - a grouping of tasks, knowledge, and attitudes needed for the performance of a job or function. The performance of a job or function may require the use of one or more competencies.

Course - organized subject matter in which instruction is offered within a given period of time, and for which credit toward graduation or certification is usually given.

Course of Study - (1) strictly, an official guide prepared for use by administrators, supervisors, and teachers of a particular school or school system as an aid to teaching in a given subject or area of study for a given grade, combination of grades, or other designated class or instruction group; may include the aims of the course, the expected outcomes, and the scope and nature of the materials to be studied, with suggestions as to suitable instructional aides, textbooks, supplementary reading, activities, suggested learning experiences, teaching methods, and measurement of achievement; (2) sometimes loosely and incorrectly used as a synonym for curriculum.

Curriculum - pl. curricula; (1) a systematic group of courses or sequences of subjects required for graduation or certification in a major field of study, for example, social studies curriculum, physical education curriculum; (2) a general overall plan of the content or specific materials of instruction that the school should offer the student by way of qualifying him for graduation or certification or for entrance into a professional or a vocational field; (3) a group of

courses and planned experiences which a student has under the guidance of the school or college: may refer to what is intended, as planned courses and other activities or intended opportunities or experiences, or to what was actualized for the learner, as in actual educational treatment or all experiences of the learner under the direction of the school.

Curriculum Guide - a substitute for a formal course of study in which desirable content is suggested rather than prescribed; includes important goals and a variety of learning experiences, teaching aids, and evaluation techniques from which those considered best suited to a particular situation may be selected.

Element - the smallest step into which it is practicable to subdivide any work activity without analyzing separate motions, movements, and mental processes.

Essential Element - as used in this report an essential element is interpreted to mean; (1) fundamental skills/knowledge which are central (core) to the objectives of the instruction or curriculum being pursued; (2) a course of study; or (3) a unit of instruction if the course is of more than one semester in length.

Job or Function - the major divisions of an occupation. Examples of the jobs or functions of a teacher are instruction, student guidance, professional development, etc. A job or function may be composed of one or more competencies necessary to complete a job or function.

Occupation - a specific occupation in an occupational division. A vocational instructor (teacher) is a specific occupation in the occupational division of education.

Occupational, Division - Divisions or occupational areas within an occupational field or category. Education is a division of the field of profesional occupations.

Occupational, Field - a categorical clustering of occupations such as professional occupations, agricultural occupations, etc.

Program, Instructional - (1) an outline of the contemplated procedures, courses, and subjects offered by a school over a given period of time.

Program, School - (1) the entire offering of the school. Including the out-of-class activities, and the arrangement or sequence of subjects and activities; syn. educational program; (2) syn. program of studeis.

Program, Vocational - a planned sequence of courses and/or activities to meet an occupational training objective. As used in this project they are defined and coded in the Classification of Instructional Programs, NCES, 1981.

Task - is composed of one or more elements and is a distinct and identifiable activity that constitutes logical and necessary steps in the performance of work.

PROFESSIONAL DEVELOPMENT NEEDS

The list of professional development needs which have been identified by this project are presented in Table II. The list of professional development needs have been ranked in descending order by level need index. This ranking has been done to assist the decision makers at various levels to determine priorities for meeting the professional improvement needs of secondary vocational office data processing instructors. It is anticipated that this list of professional needs will be used by vocational teacher educators in upgrading certification courses and by the Texas Education Agency to plan for inservice training activities and determining priorities for funding projects of personnel development under Sub-part 3.6 of the Texas State Plan for Vocational Education.

The need index concerning the desired level of professional improvement (development) ranged from a high of 5.03 to a low of -1.50. The low of -1.50 was due to laboratory instructors responding to statements appropriate only to teacher coordinators.

Thirteen of the knowledge/competency statements in the upper quartile of need were from the function of program planning, development, and evaluation. Two statements in the upper quartile were related to program management. Seven statements dealing with school/community relations were in the upper quartile of professional needs. Four statements in the function of student guidance were found in the upper quartile of needs. Two statements from the teacher function of professional role and development were in the upper quartile. Two statements in the upper quartile were related to student organizations. Eighteen of the knowledge/competency statements were in the area of working with handicapped students.

TABLE I

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
116.	Supervise student teachers.	5.03
53.	Use the basic principles of learning theory and behavior modification related to vocational instruction.	4.64
40.	Devise self-evaluation techniques for use by students.	4.33
39.	Evaluate student-learner's work qualities, personal traits, and progress on the job.	4.03
168.	Conduct a purposeful home and community visit for each handicapped student.	3.97
31.	Develop an awareness of how to recognize students with learning problems in the regular class.	3.85
84.	Assist in planning the overall objectives of the total school program.	3.84
170.	Assist in developing suitable job placement for handicapped students.	3.78
3.	Appoint andinvolve advisory committee in conducting an occupational training.	3.73
163.	Cooperate with appropriate agencies and groups in identifying career opportunities for the handicapped student.	3.73
178.	Analyze personal and professional abilities and limitations in providing instruction to handicapped persons.	3.73
167.	Counsel parents/guardians of handicapped students regarding their child's vocational education and career plans.	3.70
8.	Analyze occupations with assistance of employers and labor representatives.	3.69
110.	Refer students with special problems to appropriate sources.	3.67
162.	Identify and provide orientation for potential employers of handicapped students.	3.67
127.	Organize a student committee to assess the interest of students in joining a vocational organization.	3.58
1.	Participate on a steering committee to assist in the pre-planning activities of an occupational survey.	3.55

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
79.	Cooperate with appropriate agencies and groups in identifying career opportunities for the student.	3.53
14.	Make a task analysis to correlate instructional content in course taught with identified job competencies within the field.	3.52
89.	Interpret occupational tests and inventories to students.	3.52
76.	Demonstrate knowledge of state and local purchasing policies.	3.45
92.	Assess the ability of the individual to modify his/her behavior.	3.45
122.	Prepare students for leadership roles in student vocational organizations.	3.44
7.	Assist in the identification of the vocational education purposes and objectives for the school.	3.36
88.	Counsel parents/guardians of students regarding their child's vocational education and career plan.	3.36
52.	Apply individual instructional prescription to all pupils in the class.	3.33
80.	Maintain liaison with labor, management and employers.	3.31
4.	Collect occupational data from employers to identify occupational training.	3.03
78.	Identify and provide orientation for potential employers of students.	3.03
56.	Sequence tasks to conform with learning styles, learning pace, and inferred learning potential.	3.27
165.	Assist the handicapped student in viewing his/her assets and limitations realistically.	3.27
160.	Modify or adapt when necessary the tools, equipment, facilities, or conditions in the learning environment to meet the needs of the handicapped student.	3.24
176.	Identify and participate in professional organizations concerned with handicapped persons.	3.22
101.	Establish communication patterns for exchanging information and for cooperating with the guidance counselor.	3.21

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
169.	Assess the ability of the handicapped to modify his/her behavior.	3.15
24.	Assist in a long-range plan for integrating the students into the vocational educational program.	3.13
175.	Use and supervise service personnel in providing vocational training for handicapped persons.	3.13
62.	Structure a filing system for records and report forms used in a vocational course.	3.12
136.	Identify needs and interests of the handicapped student.	3.09
145.	Evaluate a students' performance according to the objectives on the individualized education plan (IEP).	3.09
179.	Communicate effectively with other professionals to solve problems of the handicapped student.	3.09
146.	Determine appropriate techniques for evaluating the performance of students with specific handicaps.	3.07
141.	Develop instructional units revolving around job-specific concepts and skills and the needs and abilities of handicapped students.	3.06
180.	Integrate and actively involve handicapped students into an ongoing student vocational organization.	3.06
83.	Consult advisory committee to obtain information concerning their expectations of the vocational program.	3.03
137.	Revise selection criteria to ensure program accessibility for handicapped students.	3.03
159.	Secure related services for handicapped students necessary to provide the total quality aspects of the program.	3.03
81.	Analyze enrollment trends to determine student and parent acceptance of the vocational program.	3.00
105.	Assist students in developing social, physical, and emotional security needed for obtaining and maintaining future employment.	3.00
172.	Assist handicapped students in developing social, physical, and emotional security needed for obtaining and maintaining future employment.	3.00

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
173.	Identify types of barriers (i.e., attitudinal, architectural, et cetera) that have inhibited training and employment of handicapped persons.	3.00
177.	Maintain ethical and legal standards appropriate for working with handicapped students.	3.00
181.	Provide handicapped students with opportunities for a wide range of social experiences through vocational student organizations.	3.00
32.	Use diagnostic and prescriptive assessment techniques for planning instruction.	2.969
144.	Assist in the development of individualized programs (IEP) for handicapped students.	2.968
33.	Identify the services needed to increase students' chances of being successful in programs.	2.94
85.	Assist the student in viewing his/her assets and limitations realistically.	2.94
174.	Make basic recommendations to ensure the accessibility and safety of a facility for handicapped persons.	2.94
118.	Identify and establish accessibility to professional resources within the community and state.	2.94
30.	Utilize information obtained from related disciplines about the sensory, physical, social, emotional, and cognitive abilities of the student to plan progress.	2.91
99.	Assist students in determining ways to best describe their saleable skills.	2.91
135.	Assist in a long-range plan for integrating the handicapped student into the vocational education program.	2.906
166.	Assist in identifying school vocational education purposes and goals for the handicapped student.	2.878
139.	Develop instructional activities by clustering and sequencing related tasks according to individual handicapped student's interests, abilities and needs.	2.875
140.	Select, adapt, or develop instructional materials for use with handicapped students.	2.875

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
34.	Establish criteria for evaluating student performance.	2.85
37.	Develop behavior observation skills.	2.85
161.	Assist parents and other teachers in interpreting vocational programs and services for the handicapped student.	2.85
82.	Recognize and utilize techniques of informal feedback in summarizing the vocational program through contacts with individuals in the school or community.	2.84
171.	Assist each handicapped student to develop and maintain a positive self-concept.	2.84
38.	Appraise students' performance in relation to performance objectives.	2.79
104.	Assist students in securing and in filling out applications for jobs, scholarships, educational loans, or college admission.	2.79
2.	Identify the geographical area in which an occupational survey will be conducted.	2.73
13.	Disseminate a summary of the vocational education to administrators, advisory committee members, and the board of education.	2.73
91.	Assist students in developing good study habits related to vocational training.	2.73
150.	Interact positively and naturally with the handicapped student.	2.70
59.	Prepare a capital outlay budget proposal for new equipment and supplies.	2.69
143.	Identify the services needed to increase handicapped student's chances of being successful in regular programs.	2.687
164.	Influence attitudes of regular school personnel and non-handicapped students toward acceptance of handicapped students.	2.687
93.	Assist in developing suitable job placement for students.	2.68
134.	Obtain follow-up information on handicapped students leaving or graduating from school programs.	2.66

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
15.	Defining training requirements.	2.63
126.	Acquaint prospective members and their parents with the purposes, activities and values of the student vocational organization.	2.63
86.	Assist in identifying school vocational education purposes and goals for the student.	2.59
60.	Plan an operating budget proposal for consumable supplies, services, and materials needed in a vocational course.	2.58
87.	Advise and counsel persons relative to personal and professional goals.	2.58
35.	Develop criterion reference lists for instructional units.	2.56
138.	Develop an integrated program for each handicapped student in cooperation with special education teachers and other school personnel.	2.53
182.	Establish criteria for selection of student-learners.	2.50
183.	Provide prospective student-learners with resource materials on vocational opportunities to aid them in selecting a vocation	2.50
12.	Maintain follow-up information on placement, employment, and training status of each graduate of the vocational program.	2.48
57.	Provide teaching strategies and delivery systems based upon individual learning styles and ablilities.	2.48
72.	Arrange layout of vocational laboratory to simulate or duplicate occupational environment.	2.48
90.	Develop two-way communication during conferences with students.	2.45
94.	Assist each student to develop and maintain a positive self-concept.	2.45
111.	Identify current trends of the teaching profession.	2.45
103.	Present information to students on post-high school training and education opportunities available to them.	2.44
5.	Identify the role and function of the advisory committee.	2.42

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
27.	Conduct parent/teacher conferences for planning instructional programs.	2.42
129.	Coordinate student vocational organization activities with instructional activities.	2.419
156.	Provide teaching strategies and delivery systems based upon individual learning styles and abilities of handicapped students	2.419
25.	Define appropriate expectations for laboratory or cooperative work performance of student.	2.39
43.	Teach lesson using conference technique.	2.39
45.	Provide students with opportunities to apply new information while under supervision of instructor.	2.39
28.	Develop instructional units revolving around job-specific concepts and skills and the needs and abilities of students.	2.33
49.	Teach using an illustrated talk.	2.33
70.	Schedule equipment for maximum utilization by students.	2.33
112.	Promote the attainment of the goals and objectives of the teaching profession.	2.33
95.	Determine students' background and environment.	2.31
6.	Develop an annual plan to be considered by the advisory committee.	2.30
106.	Identify and participate in professional organizations concerned with students.	2.30
23.	Develop original instructional materials.	2.27
44.	Teach lesson by the project or job method.	2.27
69.	Implement student "check-out" procedures for supplies and equipment used in the vocational laboratory.	2.27
148.	Apply individual instructional prescription to all handicapped pupils in class.	2.266
184.	Identify a prospective student-learner on basis of selection criteria and data.	2.25
18.	Write job proficiency guides.	2.24

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
157.	Revise methods of performing tasks.	2.22
50.	Utilize a variety of teaching methods and techniques to provide instruction for the student.	2.21
100.	Work with other teachers and counselors to help students with individual problems.	2.21
128.	Conduct an organizational meeting for student vocational organizations.	2.19
41.	Conduct field trips.	2.18
47.	Teach by demonstration method.	2.18
158.	Develop appropriate attitudes of nonhandicapped students toward handicapped students.	2.18
153.	Develop a procedure for fulfilling an individual instructional prescription in the classroom and laboratory situation.	2.16
26.	Identify needs and interests of the students.	2.15
63.	Supply administrators with data for vocational reports required by the State Department of Education.	2.15
155.	Sequence tasks to conform with learning styles, learning pace, and inferred learning potential of handicapped students.	2.13
9.	Identify the competencies needed for entry into an occupation.	2.12
29.	Identify concepts of the need for flexible time limits based upon individual rates of progress.	2.12
42.	Provide students with opportunities to become experienced in manipulative skills.	2.12
114.	Evaluate your personal and professional abilities and limitations.	2.12
154.	Translate statements describing physical and sensory limitations into statements concerning instructional limitations and/or adaptions.	2.19
130.	Maintain a file of publications available for the student vocational organization.	2.10

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
115.	Acquire new occupational skills needed to keep pace with technological advancement in your teaching field.	2.09
75.	Make periodic evaluations, note discrepancies and recommend corrective actions.	2.09
147.	Develop behavior observation skills concerning handicapped students.	2.07
58.	Secure related services for students necessary to provide the total quality aspects of the program.	2.06
102.	Present information to students on employment opportunities.	2.06
71.	Direct students in system for cleaning and maintaining the vocational laboratory.	2.03
149.	Use the basic principles of learning theory and behavior modification related to vocational instruction for the handicapped.	2.00
96.	Develop constructive working relationships among students.	1.97
55.	Emphasize qualities of initiative, self-reliance and independence.	1.94
113.	Participate in experimental and other data collecting research and activities.	1.94
131.	Maintain student vocational organizations as integral part of the instructional vocational education program.	1.935
152.	Modify instructional materials and equipment for individual handicapped learners' needs.	1.90
66.	Maintain an inventory of vocational supplies and equipment assigned to the laboratory.	1.88
67.	Establish a system for reparing and servicing equipment in a vocational laboratory.	1.88
108.	Analyze personal and professional abilities and limitations in providing instruction to students.	1.88
109.	Communicate effectively with other professionals to solve problems of the student.	1.88

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
151.	Emphasize qualities of initiative, self-reliance, and independence with the handicapped learner.	1.866
64.	Make basic recommendations to ensure the accessibility and safety of a facility for students.	1.85
68.	Arrange for the storage and security of vocational supplies and equipment.	1.85
123.	Provide students with opportunities for a wide range of social experiences through vocational student organizations.	1.84
73.	Observe equipment operations to insure conformance with established standards.	1.79
20.	Determine group and individual learning experiences for the unit based on individual differences of students.	1.76
46.	Provide instruction so that students can progress at a reasonable rate of speed.	1.76
11.	Write student performance goals for vocational education courses.	1.70
19.	Develop a course of study.	1.70
65.	Uphold acceptable standards of student behavior in vocational classrooms and laboratories.	1.66
117.	Serve as a leader in planning and carrying out community professional workshops.	1.65
51.	Demonstrate objectivity and sensitivity to cultural differences.	1.64
119.	Plan short-term staff improvement and/or continuing education programs.	1.63
121.	Integrate and actively involve students into an ongoing student vocational organization.	1.63
16.	Plan programs.	1.61
77.	Assist parents and other teachers in interpreting vocational programs and services.	1.58
142.	Devise flexible time limits based upon individual rates of progress.	1.56

TABLE I (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY DATA PROCESSING INSTRUCTORS

	COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
132.	Serve as an advisor or judge for district, state, regional, or national student vocational organization contests.	1.50
22.	Identify textbook, reference, and other instructional material.	1.48
48.	Teach by lecture.	1.48
98.	Demonstrate a regard for and an interest in the students as individuals.	1.48
10.	Assist in writing general objectives for courses offered in the vocational education program.	1.45
17.	Review teaching materials.	1.39
97.	Encourage students to discuss career aspirations.	1.36
120.	Demonstrate a personal commitment concerning students' participation in student vocational organizations.	1.31
54.	Interact positively and naturally with the student.	1.27
74.	Rate students for performance.	1.27
193.	Obtain from advisory committee information on ways to improve related instruction and on-the-job training.	1.25
196.	Complete a cooperative training agreement unique to meeting the needs of the individual.	1.25
107.	Maintain ethical and legal standards appropriate for working with students.	1.18
36.	Formulate a system of grading consistent with school policy.	1.15
6[illegible].	Prepare purchase requests for approved vocational equipment and supplies.	1.09
125.	Contact state leadership regarding the steps to be followed in organizing a student vocational organization.	1.06
186.	Select student-learner's training stations.	1.00
133.	Participate in state,district, regional and national activities of the student vocational organization.	.91
21.	Prepare lesson plans.	.88

TABLE 1 (CON'T.)

PROFESSIONAL DEVELOPMENT NEEDS OF SECONDARY

DATA PROCESSING INSTRUCTORS

COMPETENCY/KNOWLEDGE STATEMENT	NEED INDEX
124. Obtain approval from school administration for establishing a student vocational organization.	0.68
185. Match a student-learner's unique characteristics with an appropriate training station.	0.00
187. Establish criteria to evaluate and approve training stations.	0.00
189. Assess educational adequacy of a prospective training station's facilities and equipment.	0.00
191. Develop a training plan for student-learner with employer.	0.00
192. Sponsor employer/student-learner appreciation event for the vocational program.	0.00
188. Assess training capability of the prospective training station.	-0.75
195. Review course content with the training sponsor.	-0.75
194. Uphold acceptable standards of student behavior at training stations.	-1.00
190. Supervise student-learner's on-the-job experience.	-1.50

OCCUPATIONAL COMPETENCIES FOR SECONDARY OFFICE DATA PROCESSING PROGRAMS

One of the deliverables to be produced by this project was a list of validated competencies for developing a framework for a curriculum in data processing. The preparation of this product also achieved objective 3 of the project "To validate occupational competencies to be acquired by students completing secondary vocational data processing programs." The list of validated occupational competencies which may be used for developing a framework for a curriculum and to be acquired by students completing secondary vocational business data processing programs is presented, by CIP Codes in Table II.

STATE-OF-THE-ART

When vocational instruction was began in the field of data processing it was placed under the vocational instructional area of trade and industrial education for administrative and funding purposes. The placement of electronic data processing under trade and industrial (technical) education was necessary to qualify for vocational funds. Instruction in electronic data processing was funded by vocational education prior to instruction in office education being eligible for vocational funds.

With the advances in technology and the increased application of data processing in the business world there has been a dramatic change in the job classifications and occupational competencies of workers in data processing. Through a process of job analysis and industrial classification of occupations the occupations which emerged with the new and improved application of data processing were categorized as business or office occupations in data processing.

Electronic data processing which began as a technical program has grown tremendously as a vocational instructional program. It has been expanded into three major categories of instructional programs. The three categories are: (1)

TABLE II

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS COMPLETING SECONDARY OFFICE DATA PROCESSING PROGRAMS

COMPETENCY STATEMENT AND NUMBERS	OFFICE EDUCATION PROGRAM CODES 07.----			
	0302	0303	0304	0305
1. Perform restart procedures on computer software system.	✓			✓
2. Perform restart procedures on computer hardware system.	✓			✓
3. Perform software system initialization procedures.	✓			✓
4. Perform hardware initialization procedures.	✓			✓
5. Interact with hardware system via console with software.	✓			
6. Power up CPU.	✓			✓
7. Power down CPU.	✓			✓
8. Respond to or correct errors via console operation.	✓			✓
9. Review console output for job status.	✓			
10. Initiate batched job processing.	✓			
11. Determine causes of hardware stops or malfunctions.	✓			
12. Perform minor maintenance on hardware.	✓			
13. Follow instructions necessary to run job.	✓			
14. Keep logs of runs and job status.	✓			
15. Keep logs of hardware problems and recovery procedures.	✓			
16. Mount/dismount magnetic disk.	✓			
17. Use operational control language.	✓			✓
18. Use system utilities to produce desired results.	✓			
19. Perform remote processing operations.	✓			
20. Prepare for output on required medium.	✓			

TABLE II (CON'T.)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS COMPLETING SECONDARY OFFICE DATA PROCESSING PROGRAMS

COMPETENCY STATEMENT AND NUMBERS	OFFICE EDUCATION PROGRAM CODES 07.----			
	0302	0303	0304	0305
21. Ensure proper care of storage medium.	✓			
22. Perform backup operations.	✓			
23. Schedule computer room operations.	✓			
24. Interpret and apply instructions from written procedures.	✓			
25. Convert routine items of information into codes for processing.	✓	✓		
26. Manually record alphabetic or numeric data, and calculate batch totals.		✓		
27. Receive and review input and output verify for accuracy and completeness of source documents.		✓		
28. Maintain records and coding systems necessary to process and review document input and output.		✓		
29. Investigate and correct problems causing incorrect input or output.		✓		
30. Operate data entry hardware.		✓		
31. Perform operator maintenance on data entry hardware.	✓	✓		
32. Perform transcription of source data into magnetic coded media.		✓		
33. Classify and catalog reels created by system.		✓		
34. Prepare file labels.		✓		
35. Maintain records of equipment and supply usage.		✓		
36. Adhere to file security procedures.	✓	✓		
37. Oversee disbursement and/or storage of data processing materials and supplies.		✓		
38. Requisition of data processing forms and supplies.		✓		

TABLE II (CON'T.)
OCCUPATIONAL COMPETENCIES TO BE ACQUIRED
BY STUDENTS COMPLETING SECONDARY
OFFICE DATA PROCESSING PROGRAMS

COMPETENCY STATEMENT AND NUMBERS	OFFICE EDUCATION PROGRAM CODES 07.----			
	0302	0303	0304	0305
39. Process materials and supplies recieved.		✓		
40. Use file building techniques and procedures.		✓		
41. Classify files by their physical properties.		✓		
42. Use file maintenance techniques.		✓		
43. Change, align or remove paper in printers.	✓		✓	
44. Correct stoppages on printers.	✓		✓	
45. Notify supervisors or management of machine failure, downtime, or processing problems.	✓		✓	
46. Correct stoppages on card readers.			✓	
47. Power up or power down peripheral hardware.			✓	
48. Maintain print quality.			✓	
49. Correct stoppages on magnetic or paper tape.			✓	
50. Correct stoppages on card punch machines.			✓	
51. Mount or dismount magnetic or paper tapes.			✓	
52. Load or unload punch cards in or from automatic data processing hardware.			✓	
53. Load programs or data from media (i.e. cards, disk, tape).			✓	
54. Respond to or correct errors via peripheral console.			✓	
55. Perform operator maintenance on peripheral hardware.			✓	
56. Punch cards.		✓	✓	
57. Label magnetic media externally.		✓	✓	
58. Notify supervisor of computer operations.	✓		✓	
59. Reproduce cards.			✓	

TABLE II (CON'T.)
OCCUPATIONAL COMPETENCIES TO BE ACQUIRED
BY STUDENTS COMPLETING SECONDARY
OFFICE DATA PROCESSING PROGRAMS

COMPETENCY STATEMENT AND NUMBERS	OFFICE EDUCATION PROGRAM CODES 07.----			
	0302	0303	0304	0305
60. Convert or record data from one media to another media, as card to tape or tape to disk.			✓	
61. Interpret indicator lights on peripheral equipment.	✓		✓	
62. Clean or inspect magnetic media.		✓	✓	
63. Correct stoppages on disk drives.			✓	
64. Burst, decollate, and assemble printed output.			✓	
65. Mount or dismount carriage control tapes (printer).			✓	
66. Perform start/stop and restart procedures on card punch (with jam clearing).			✓	
67. Store and handle reels of magnetic tape.		✓	✓	
68. Perform start/stop and restart procedures on card reader.			✓	
69. Perform start/stop and restart procedures on disk drive.			✓	
70. Load and unload a disk drive.			✓	
71. Determine causes of hardware stops or malfunctions.			✓	
72. Perform minor maintenance of hardware.			✓	
73. Follow instructions necessary to run job.	✓		✓	
74. Keep logs of hardware problems and recovery procedures.			✓	
75. Prepare for output on required medium.			✓	
76. Ensure proper care of storage medium.		✓	✓	
77. Interpret and apply instructions from written procedures.	✓		✓	
78. Design and code computer programs.				✓

TABLE II (CON'T.)
OCCUPATIONAL COMPETENCIES TO BE ACQUIRED
BY STUDENTS COMPLETING SECONDARY
OFFICE DATA PROCESSING PROGRAMS

COMPETENCY STATEMENT AND NUMBERS	OFFICE EDUCATION PROGRAM CODES 07.----			
	0302	0303	0304	0305
79. Prepare computer routines and programs.				✓
80. Test computer routines and programs using appropriate test data.				✓
81. Document computer routines and programs.				✓
82. Prepare system or program test data.				✓
83. Prepare adequate computer edits of input data.				✓
84. Update program documentation.				✓
85. Analyze output products for compliance with specifications and standards.				✓
86. Determine the cause of invalid output and make necessary corrections (debug).				✓
87. Utilize state-of-the-art techniques, such as Top Down Design and Structured and Programing.				✓
88. Confer with systems analyst and subject matter personnel in preparation of program routines.				✓
89. Develop and maintain generalized utility routines for application in appropriate overall programs.				✓
90. Review existing routines for applicability of new techniques.				✓
91. Analyze and update existing programs.				✓
92. Enter data or programs into computer via a terminal.				✓
93. Initiate batched job processing, and convert or record data from one media to another.				✓
94. Code job control languages.				✓
95. Prepare or revise program specifications.				✓
96. Estimate programming effort based on specifications.				✓

TABLE II (CON'T.)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS COMPLETING SECONDARY OFFICE DATA PROCESSING PROGRAMS

COMPETENCY STATEMENT AND NUMBERS	OFFICE EDUCATION PROGRAM CODES 07.----			
	0302	0303	0304	0305
97. Desk check programs.				✓
98. Design error handling routines.				✓
99. Develop restart procedures in computer programs.				✓
100. Maintain schedule to ensure completion of programming projects.				✓
101. Prepare or assist in development or operator instructions and related documentation.				✓
102. Write procedures for use of CRT.				✓
103. Design screen format for CRT.				✓
104. Program in BASIC.				✓
105. Program in COBOL.				✓
106. Program in PASCAL.				✓

CIP 07.03 which is found at both the secondary and post-secondary levels; (2) 11.00 which is offered by four year colleges; and (3) 15.03 which is conducted at the post-secondary level. The technical program, CIP 15.03, has the same instructional objectives as did the program of electronic data processing which was the original vocational instructional program in the field of data processing. With the assignment of the programs at the Federal level, to USOE Code category 14.02, state level leadership was transferred to vocational office occupations in 1968.

During the 1983-84 school year, seventy-three vocational business data processing programs were being conducted in Texas public school districts. The seventy-three programs had an enrollment of 1,840 eleventh and twelfth grade students. Eighteen of the seventy-three programs were implemented as new programs in the 1983-84 school year. During the school year of 1982-83, 1,046 secondary students satisfactorily completed programs in vocational office data processing. Distribution of the completers by program is as follows:

CIP Code	Male	Female	Total
07.0302	43	156	199
07.0303	23	152	175
07.0304	1	10	11
07.0305	19	14	33
07.0306		3	3
07.0399	240	375	615

The above distribution clearly shows that equal access is provided in terms of the number of male and female completers.

The latest follow-up data (1981-82) on completers revealed that of 173 program completers, seventy were employed in the occupation or related occupation for which instruction was provided and sixty-seven were continuing their education. Based on information in the current Texas State Plan for Vocational education, completers of business data programs will be 697 less than the projected employment opportunities for fiscal year 1985. The only program

in which completers are expected to exceed employment opportunities is the program of "business data processing and related programs, other" (CIP 07.0399). It has been projected that completers of this program (07.0399) will exceed employment opportunities by 181 in fiscal year 1985.

Instructors of secondary data processing programs are highly qualified in subject content and basic teaching skills. These qualifications are evident by a thorough review of their occupational competencies listed on a statement of qualifications and completion of quality teacher certification courses. Professional improvement activities are provided to the instructors through in-service training programs organized and conducted by state staff each summer.

At the present time, the Texas Education Agency has not developed or contracted for development and distribution of curriculum guides or basic course outlines for secondary vocational office data processing programs. Development and use of curriculum guides, courses of study, and instructional materials has been left to local school districts. Instructors in the local school districts have worked closely with local craft advisory committees in developing the materials at the local level. In 1984, the State Board of Education placed the instructional programs of data processing under the vocational program area of "Technical" as reported in 19-TAC-75, Curriculum. It is not known at the time this report was prepared as to whether the programs conducted under the provision of Chapter 75 will be reported under Office Occupations category 07.03 or under Technical Occupations 15.03.

COMPETENCIES TO BE ACQUIRED

by STUDENTS

in DATA PROCESSING PROGRAMS

The list of occupational competencies presented in Table II were for all of the programs of office (business) data processing surveyed in this project. As an aid to curriculum material developers and instructors of data processing

programs, the occupations for which students enrolled in the programs may receive instruction have been cataloged. T[illegible] cataloging has been done by CIP code and Title*. For each CIP Program title there has been an identification of each occupation by DOT code and job description. A cataloged description of the components of secondary office data processing programs is presented in Table III. The Competencies to be acquired by students completing specific programs of data processing are presented in Table IV. Combining Tables III and IV provides a catalog of competencies by program and occupation.

Footnotes and interpretation of codes used in Table III are as follows:

Data Sources
1 A Classification of Instructional Programs for [illegible]ccupational Education and Technology. TEA
2 Fourth Edition of the Dictionary of Occupational Titles.
3 Third Edition of Vocational Preparation and Occupations. NOICC
4 Selected Characteristics of Occupations, U.S. Department of Labor
5 Texas Occupational Demand Forecast 1985. TEC

Characteristics of Occupations**:

M	L
a. Mathematical Development or Arithmetic Computation (M): The acquisition of basic mathematical skills, not specifically vocationally oriented, such as the ability to solve arithmetic, algebraic, and geometic problems ranging from fairly elemental to dealing with abstractions.	b. Language Development or Literacy Training (L): The acquisition of language skills, not specifically vocationally oriented, such as mastery of an extensive vocabulary use of correct sentence structure, punctuation, and spelling; and an appreciation of literature.

level	Mathematical Development	level	Language Development
6	Advanced calculus: Work with limits, continuity, real number systems, mean value theorems, and implicit function theorems.	6	Reading: Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents.
	Modern algebra: Apply fundamental concepts of		Writing: Write novels, plays, editorials,

* Source: Third Edition of Vocational Preparation and Occupations (VPO), National Occupational Information Coordinating Committee.

**Source: Selected Characteristics of Occupations, U.S. Department of Labor.

theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operations methods, and functions of real and complex variables.

Statistics:
Work with mathematical statistics, mathematical probability, and applications, experimental design, statistical inference, and econometrics.

5 Algebra:
Work with exponents and logrithms, linear equations, quadratic equations, mathematical inducation and binomial theorems, and permutations.

Calculus:
Apply concepts of analytical geometry, differentiations and integration of algebraic functions with applications.

Statistics:
Apply mathematical operations to frequency distributions, reliability, and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, and factor analysis.

4 Algebra:
Deal with system of real numbers; linear, quadratic, rational, exponential; logarithmic angle, and circular functions, and inverse functions; related algebraic solution of equations and inequalities; limits and continuity, and probability and statistical inference.

Geometry:
Deductive axiomatic geometry, plane and solid; and rectangular coordinates.

Shop Math:
Practical application of fractions, percentages, ratio and proportion, mensuration, logarithms, slide rule, practical algebra, geometric

journals, speeches, manuals, critiques, poetry, and songs.

Speaking:
Conversant in the theory, principles, and methods of effective and persuasive speaking, voice and diction phonetics and discussion and debate.

5 Same as level 6

4 Reading:
Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias.

Writing:
Prepare business letters, expositions, summaries, and reports, using prescribed format, and conforming to all rules of punctuation, grammar, diction and style.

Speaking:
Participate in panel discussions, dramatizations, and debates. Speak extemporaneously on a variety of subjects.

	construction and essentials of trigonometry.	
3	Compute discount, interest, profit, and loss; commission, markups, and selling price; ratio and proportion, and percentages. Calculate surfaces, volumes, weights, and measures. Algebra: Calculate variables and formulas, monomials and polynomials; ratio and proportion variables; and square roots and radicals. Geometry: Calculate plane and solid figures, circumference, area, and volume. Understand kinds of angles, and properties of pairs and angles.	3 Reading: Read a variety of novels, magazines, atlases, and encyclopedias. Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work. Writing: Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech. Speaking: Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice.
2	Add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Compute ratio, rate, and percent. Draw and interpret bar graphs. Perform arithmetic operations involving all American monetary units.	2 Reading: Passive vocabulary of 5,000-6,000 words. Read at rate of 190-215 words per minute. Read adventure stories and comic books, looking up unfamiliar words in dictionary for meaning spelling, and pronunciation. Read instructions for assembling model cars and airplanes. Writing: Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs. Speaking: Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variations in word order, using present, perfect, and future tenses.
1	Add and subtract two digit numbers. Multiply and divide 10's and 100's	1 Reading: Recognize meaning of 2,500 (two-

by 2,3,4,5. Perform the four basic arithmetic operations with coins as part of a dollar.
Perform operations with units such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.

or three- syllable) words. Read at a rate of 95-120 words per minute.
Compare similarities and differences between words and between series of numbers.

Writing:
Print simple sentences containing subject, verb, and object, and series of numbers, names, and addresses.

Speaking:
Speak simple sentences, using normal word order, and present and past tenses.

Training Time:*

This represents the amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. The training may be acquired in a school, work, military, institutional, or a vocational environment. It does not include orientation training required of even every fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes training given in any of the following circumstances:

a. Vocational education (such as high school commercial or shop training, technical school, art school, and that part of college training which is organized around a specific vocational objective);

b. Apprentice training (for apprenticeable jobs only);

c. In-plant training (given by an employer in the form of organized classroom study);

d. On-the-job training (serving as learner or trainee on the job under instruction of a qualified worker);

e. Essential experience in other jobs (serving in less responsible jobs which lead to the higher grade job or serving in other jobs that qualify).

The following is an explanation of the various levels of specific vocational preparation.

Short demonstration.

Code	Time
1	Short demonstration.
2	Anything beyond short demonstration up to and including 30 days.
3	Over 30 days up to and including 3 months.
4	Over 3 months up to and including 6 months.
5	Over 6 months up to and including 1 year.
6	Over 1 year up to and including 2 years.
7	Over 2 years up to and including 4 years.
8	Over 4 years up to and including 10 years.
9	Over 10 years.

* Source: Selected Characteristics of Occupations, U. S. Department of Labor.

Annual Average Job Openings
1978 To 1985*

OES Code	Occupation	Annual Average Job Openings
31000	Computer Programmers	930
61105	Computer Operators	775
61330	File Clerks	1,485
61336	In-File Operators	50
61107	Keypunch Operators	1,695
61109	Periperal EDP Equip. Oprs.	140
62003	Production Clerks	910
61392	Typists	4,305
6113	Tabulating Machine Operators	25

Table III and Table IV compose a complete cataloging of office (clerical) occupations in the field of data processing. Table III provides job descriptions, DOT Codes, requirements of mathematics and language development, training time, OES Code, and average annual job opportunities for the years of 1978 through 1985. A brief description of the occupations which was taken from EXPLORING CAREERS, U.S. Department of Labor, 1981, is presented below.

Office Occupations

Occupation	Nature and Places of Work	Training and Qualifications	Other Information
COMPUTER OCCUPATIONS			
Computer Operating Personnel	Most operating personnel work for manufacturers, banks, wholesale and retail businesses, government agencies, and data processing firms. There are several different kinds of operating personnel including key entry operators and high speed printer operators	Employers usually hire high school graduates, and prefer people with college training in data processing. Beginners are trained on the job.	Because computers must be operated at carefully controlled temperatures, operators work in air-conditioned rooms.
Programmers	Most programmers work for large firms that have big computer systems This includes manufacturers, banks, insurance companies, data processing firms, and government agencies.	College training generally is necessary for a job as a programmer. Firms that use computers to handle scientific and engineering problems usually	Programmers occasionally must work nights and weekends, in order to use the computer when it is available.

*Source: Texas Occupational Demand Forecast, 1985.

require their
programmers to have
a bachelor's degree,
preferably in science
or engineering.

A review of Table III will provide the following information about the occupation of computer operator.

Computer operators may receive educational preparation by enrolling in the vocational program business computer and console operation (CIP 07.0302). The DOT Code for computer operator is 213.362-010. The mathematical development (M) level needed to benefit from instruction is 2 (add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Compute ratio, rate, and percent. Draw and interpret bar graphs. Perform arithmetic operations involving all American monetary units). The language development (L) level needed is 3 (Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work. Writing: Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech. Speaking: Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice). The training time for a computer operator is 6. The code 6 is equivalent to over one yeat up to and including two years of training time. This two years of training time does not include orientation to the job as required by the special conditions of an employer.

The OES survey code for a computer operator is 61105. The average annual job openings for 1984 and 1985 is 775. Table IV presents a listing of occupational competencies performed by incumbent workers and which should be acquired by students completing the program for which the competencies are listed.

A complete cataloging of the occupational competencies has been completed by combining the information presented in Tables III and IV.

TABLE III

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0302 Business Computer and Console Operation						
COMPUTER OPERATOR (clerical) console operator. Monitors and controls electronic computer to process business, scientific, engineering, or other data, according to operating instructions: Sets control switches on computer and *peripheral equipment*, such as external memory, data communicating, synchronizing, *input* and *output* recording or display devices, to integrate and operate equipment according to program, *routines*, *subroutines*, and data requirements specified in written operating instructions. Selects and loads input and output units with materials, such as tapes or punchcards and printout forms, for operating runs or oversees operators of peripheral equipment who perform these functions. Moves switches to clear system and start operation of equipment. Observes machines and control panel on computer *console* for error lights, verification printouts and error messages, and machine stoppage or faulty output. Types alternate commands into computer console, according to predetermined instructions, to correct error or failure and resume operations. Notifies supervisor of errors or equipment stoppage. Clears unit at end of operating run and reviews schedule to determine next assignment. Records operating and down time. Wires control panels of peripheral equipment. May control computer to provide input or output service for another computer under instructions from operator of that unit. May operate small-scale computer (known variously as mini-limited-storage-, or desk-size computer) and related *on-line* or *off-line* equipment and be designated SMALL-SCALE-COMPUTER OPERATOR (clerical).	213.362-010	5	4	7	61105	775

TABLE III (CON'T.)
CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0303 Business Data Entry Equipment Operation						
IN-FILE OPERATOR (bus. ser.) Operater CRT (Cathode-Ray Tube) to post or retrieve credit information and compiles and reports credit information to subscribers of credit-reporting agency: Receives telephone requests from subscribers for information about credit applicants and identifies caller by code. Types coded inquiry details on keyboard of CRT machine for computer input. Reads data from computer printout on display screen to subscriber over telephone, or activates machine to print out information for mailing to subscriber. Occasionally compiles and types additional credit data on machine for input into computer memory bank.	203.362-014	2	3	4	61336	50
TERMINAL-SYSTEM OPERATOR (clerical) Operates computer terminal and compiles data to produce business, scientific, or technical reports and publications in printlike format: Reviews source documents, such as correspondence, company records, statistical tables, and accompanying instructions, such as paragraphing, indentation, line spacing, and other style requirements. Arranges data input sequence according to manuals. Types coded commands on computer terminal keyboard to enter, store, retrieve, or delete data using knowledge of coding system. Proofreads printout of draft copy to correct errors and verify format specifications. Types coded command to computer to produce finished copy on paper, magnetic tape, or punched cards for subsequent reproduction as completed texts by peripheral equipment, such as high-speed printers.	203.362-018	3	4	5	61392	(included with Typist)

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title, and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0303 Business Data Entry Equipment Operation (continued)						
DATA TYPIST (clerical) Operates special-purpose electric typewriter to convert alphabetic, numeric, and symbolic data into coded form on punchcards or tapes: Loads decks of punchcards or reels of magnetic or paper tape into machine. Moves switches to adjust machine and auxiliary equipment to produce desired cards or tapes. Types computer program from worksheet, and input data, such as specified items from business forms, which machine converts to holes or magnetic impulses on cards or tapes. Proofreads typed copy to identify errors, and retypes copy or presses buttons to activate correctional devices built into machine. May insert tape or cards into reader attachment for automatic duplication of business correspondence or records. Important variables may be trade name of machine operated.	203.582-022	2	3	4	61107	1,695
DATA-CODER OPERATOR (clerical) magnetic-tape encoder Operates machine with keyboard identical to key-punch machine to transcribe data onto magnetic tape for computer input: Examines codes on forms and source documents to determine work procedures. Positions reel of magnetic tape on spindle and clips source document to copy holder. Sets switches and presses keys which generate magnetic impulses onto tape to record data from forms and documents. Removes completed reel, marks and attaches identifying label, and sets reel and source documents aside for verification by coworkers. Positions tape completed by coworkers on spindle, sets switches, and depresses keys to recopy data from original source documents. Observes lights on machine console to	203.582-026	2	4	4	61107	(included with data typist)

TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0303 Business Data Entry Equipment Operation (continued) note error indications and presses keys to make corrections. Removes verified reel and routes with source documents for computer processing.						
KEYPUNCH OPERATOR (clerical) card-punch operator; printing-card-punch operator; printing-punch operator. Operates alphabetic and numeric keypunch machine, similar in operation to electric typewriter, to transcribe data from source material onto punchcards, paper or magnetic tape, or magnetic cards, and to record accounting or statistical data for subsequent processing by automatic or electronic data processing equipment: Attaches skip bar to machine and previously punched program card around machine drum to control duplication and spacing of constant data. Loads machine with decks of tabulating punchcards, paper or magnetic tape, or magnetic cards. Moves switches and depresses keys to select automatic or manual duplication and spacing, select alphabetic or numeric punching, and transfer cards or tape through machine stations. Depresses keys to transcribe new data in prescribed sequence from source material into perforations on card, or as magnetic impulses on specified locations on tape or card. Inserts previously processed card into card gage to verify registration of punches. Observes machine to detect faulty feeding, positioning, ejecting, duplicationg, skipping, punching, or other mechanical malfunctions and notifies supervisor. Removes jammed cards, using pruing knife. May tend machines that automatically sort, merge, or match punchcards into specified groups. May verify accuracy of data, using verifying machine [SORTING-MACHINE OPERATOR (clerical)].	203.582-030	2	2	3	61107	(included with data typist)

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
7.0303 Business Data Entry Equipment Operation (continued)						
TERMINAL OPERATOR (clerical) computer-terminal operator. Operates on-line computer typewriter to terminal to transmit data to or to receive data from source documents, using knowledge of coding system. Inserts specified paper into typewriter carriage and presses key to obtain printout or activates machine to display facsimile on viewing screen with source documents to detect errors. Backspaces and strikes over orignal material, using terminal keyboard, to correct errors. Presses code key to transmit corrected data via telephone lines to computer. May operate terminal to record data on perforated tape. May place tape in transmitter to transmit data to remote computer. May maintain incoming and outgoing message logs.	203.582-054	2	3	4	61392	(included with typist)
TAPE LIBRARIAN (clerical) Classifies, catalogs, and maintains library of reels of magnetic or punched paper tape or decks of magnetic cards or punchcards used for electronic data processing purposes: Classifies and catalogs material according to content, purpose of program, routine or subroutine, and date on which generated. Assigns code conforming with standardized system. Prepares index cards for file reference. Stores materials and records according to classification and catalog number. Issues materials and maintains charge-out records. Inspects returned tapes or cards and notifies supervisor if worn or damaged. May maintain files of program developmental records and run books (operating instructions). May operate keypunch to replace defective punchcards and produce data cards to identify punchcard decks [KEYPUNCH	206.387-030	2	4	4	61330	(included with file clerks)

TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0303 Business Data Entry Equipment Operation (continued)						
OPERATOR (clerical)]. May work in computer room operations, performing such tasks as loading and removing printout forms, reels of tape, and deck of cards from machines.	206.387-030 (cont.d)					

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title, and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0304 Business Data Peripheral Equipment Operation						
COMPUTER-PERIPHERAL-EQUIPMENT OPERATOR (clerical) assistant console operator; tape handler. Operates *on-line* or *off-line* peripheral machines according to written or oral instructions, to transfer data from one form to another, print *output* and read data into and out of digital computer: Mounts and positions materials, such as reels of *magnetic tape* or *paper tape* onto spindles, decks of cards in hoppers, bank checks in magnetic ink reader-sorter, notices in *optical scanner*, or output forms and carriage tape in printing devices. Sets guids, keys, and switches according to oral instructions or *run* book to prepare equipment for operation. Selects specified wired control panels or wires panels according to diagrams and inserts them into machines. Presses switches to start off-line machines, such as card tape converters, or to interconnect on-line equipment, such as tape or card computer *input* and output devices, and high speed printer or other output recorder. Observes materials for creases, tears, or printing defects and watches machine and error lights to detect machine malfunction. Removes faulty materials and notifies supervisor of machine stoppage or error. Unloads and labels card or tape input and output and places them in *storage* or routes them to library. Separates and sorts printed output forms, using decollator, to prepare them for distribution. May operate punchcard tabulating machines, such as sorters and collators. May be designated according to specialty of equipment operated as CARD-TAPE-CONVERTER OPERATOR (clerical); HIGH-SPEED-PRINTER OPERATOR (clerical).	213.382-010	2	3	4	61109	140

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0304 Business Data Peripheral Equipment Operation (continued)						
AUXILIARY-EQUIPMENT OPERATOR, DATA PROCESSING (clerical) Tends one or more of the following office machines that sort, assemble, separate, convert, or reproduce computer *input* or *output* data in *electronic data-processing* establishment or department: Tends sorting machine that automatically groups cards or other materials in numerical or alphabetical sequence according to any classification punched in materials [SORTING-MACHINE OPERATOR (clerical]. Tends reproducer that automatically punches information from one set of punched source cards into another set of cards. Tends interpreting machine that translates alphabetical or numerical data from punched holes in card to tape to printed matter on same or different card or tape, or onto printout sheet. Tends collator that merges two or more sets of input or output cards into one set of given sequence or verifies uniformity of information printed on two or more sets of cards. Tends bursting and decollating equipment that removes carbons from printout sheets and separates sheets [BURSTING-MACHINE TENDER (clerical)]. Performs other clerical duties as assigned by SUPERVISOR, COMPUTER OPERATIONS (clerical), or SUPERVISOR, MACHINE RECORDS UNIT (clerical), to facilitate operation of department. May be designated by specialization of machine tended as COLLATOR OPERATOR, DATA PROCESSING (clerical); INTERPRETER OPERATOR, DATA PROCESSING (clerical); REPRODUCER OPERATOR, DATA PROCESSING (clerical).	213.685-010	1	1	3	61109	(included with 61109 above)

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0304 Business Data Peripheral Equipment Operation (continued)						
SORTING-MACHINE OPERATOR (clerical card-sorting-machine operator; sorter-machine operator; verifier-sorter operator. Tends machine that automatically sort perforated tabulating cards into specified groups: Riffles cards to prevent over feeding and jamming and places cards in feedbox. Pushes buttons on sorting control panel to regulate sorting process. Starts machine and sights through holes to verify sorting. Removes sorted cards from bins. Removes jammed cards to clear machine. May reproduce damaged cards on keypunch machine. May operate tabulating machine, verifying machine, or switchboard.	208.685-030	1	2	3	61109	(included with above)
TABULATING-MACHINE OPERATOR (clerical) tabulating-equipment operator; tabulator operator. Operates machine that processes data from tabulating cards into printed records: Wires and installs tabulating-machine *plugboard*, or inserts prewired control panel, using wrenches and screwdriver. Positions stack of cards to be tabulated and starts machine. Observes machine for malfunctions, such as sorting, interpreting, reproducing, and collating [AUXILIARY-EQUIPMENT OPERATOR, DATA PROCESSING (clerical)]. May maintain files of punched cards. May be designated according to trade name of machine operated.	213.682-010	2	2	5	61113	25

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
07.0305 Business Data Programming						
PROGRAMER, DETAIL (clerical(program coder; programer trainee. Selects symbols from coding system peculiar to make or model of digital computer and codes in seccessive steps of completed program for conversion to machine instructions to process data or to control industrial processes: Reads and interprets sequence of alphabetic, numeric, or special characters from handbook or memory for each program step to translate into machine language or psedo (symbolic) code that can be converted by computer processor into machine instructions. Records symbols on worksheet for transfer to punchcards or machine input tape. Marks code sheet indicate relationship of code to program steps to simplify debugging of program. Confers with programing personnel to clarify intent of program steps. May work as understudy to PROGRAMER, BUSINESS (profess. & kin.) or PROGRAMER, ENGINEERING AND SCIENTIFIC (profess. &kin.), performing such additional tasks as converting flow charts and diagram of simple problem from rough to finished form or making minor changes in established programs to adapt programs to new requirements.	219.367-026	3	4	5	31001	930

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
11.0201 Computer Programming						
PROGRAMER, BUSINESS (profess. & kin.) Converts symbolic statements of administrative data or business problems to detailed logical flow charts for coding into computer language: Analyzes all or part of workflow chart or diagram representing business problem by applying knowledge of computer capabilities, subject matter, algebra, and symbolic logic to develop sequence of program steps. Confers with supervisor and representatives of departments concerned with program to resolve questions of program intent, output requirements, input data acquisition, extent of automatic programming and coding use and modivication, and inclusion of internal checks and controls. Writes detailed logical operations in computer [PROGRAMER, DETAIL (clerical)]. Devises sample input data to provide test of program adequacy. Prepares block diagrams to specify equipment configuration. Observes or operates computer to test coded program, using actual or sample input data. Corrects program errors by such methods as altering program steps and sequence. Prepares written instructions (run book) to guide operating personnel during production runs. Analyses reviews, and rewrites programs to increase operating effciency or adapt to new requirements. Compiles documentation of program development and subsequent revisions. May specialize in writing programs for one make and type of computer.	020.162-014	5	5	7	31001	(included in above)

TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
11.0201 Computer Programming (continued)						
PROGRAMER, CHIEF, BUSINESS (profess.& kin.) coordinator, computer programing; lead programer. Plans, schedules, and directs preparation of programs to process business data and solve business-oriented problems by the use of electronic data processing equipment: Consults with managerial and systems analysis personnel to clarify program intent, indicate problems, sugges changes, and determine extent of automatic programming and coding techniques to use. Assigns, coordinates, and reviews work of programing personnel. Develops own programs and routines from work flow charts or diagrams. Consolidates segments of program into complet sequence of terms and symbols. Breaks down program and input data for successive computer passes, depending on such factors as computer storage capacity and speed, extent of peripheral equipment, and intended use of output data. Analyzes test runs on computer to correct or direct correction of coded program and input data. Revises or directs revision of existing programs to increase operating efficiency or adapt to new requirements. Compiles documentation of program development and subsequent revisions. Trains subordinates in programming and program coding Prescribes standards of terminology and symbology to simplify interpretation of programs. Collaborates with computer manufacturers and other users to develop new programing methods. Prepares records and reports.	020.167-018	5	5	7	31001	(included in above)
PROGRAMER, INFORMATION SYSTEM (profess. & kin.) Develops and writes natural and artificial language computer programs to store, locate, and retreive specific documents, data, and information. Develops computer programs for input and retrieval	020.187-010	5	5	7	31002	(not identified by TEC)

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TABLE III (CON'T.)

CATALOG OF SECONDARY OFFICE DATA PROCESSING PROGRAMS

CIP Number, Program Title , and Job Description	DOT Code	M	L	Training Time	OES Code	Employment Opportunities 1985 (Texas)
11.0201 Computer Programming (continued)						
of physical science, engineering or medical information, text analysis, and language, law, military or library science data. Writes programs for classification, indexing, input, storage, and retreival of data and facts, display devices, and interfacing with other systems equipment. Devises sample input data to test adequacy of program and observes or runs test of program using sample or actual data. Corrects program errors by altering program steps and sequence. Confers with INFORMATION SCIENTIST (profess. & kin.) to resolve questions of program intent, input data acquisition, time sharing, output requirements, coding use and modification, and inclusion of internal checks and controls for system integrity.	020.187-010 (cont.d)					
PROGRAMER, PROCESS CONTROL (profess. & kin.) Plans and writes computer programs for control systems that automate operations: Writes complete sequence of machine instructions and routines necessary to complete processing cycle. Developes programs according to specification and standards of both process and computer system. Prepares flow charts, documents, and sequence logic; and methods of input, monitor, and display for open and closed loop, analog or digital systems. Writes programs for such systems as steel making and rolling mill operations, sanitation plants, combustion systems, chemical and fuel recovery systems, computerized production testing, automatic truck loading, steam boilers, and other commercial and industrial process control systems. For numerical control programming. see TOOL PROGRAMER, NUMERICAL CONTROL (any ind.).	020.187-014	5	5	7	31002	(not identified by TEC)

TABLE IV

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS

BY PROGRAM

PROGRAM: 07.0302 Business Computer and Console Operation

COMPETENCIES:

Perform restart procedures on computer software system.	Follow instructions necessary to run job.
Perform restart procedures on computer hardware system.	Keep logs of runs and job status.
Perform software system initialization procedures.	Keep logs of hardware problems and recovery procedures
Interact with hardware system via console with software.	Mount/dismount magnetic disk.
Power up CPU.	Use operational control language.
Power down CPU.	Use system utilities to produce desired results.
Respond to or correct errors via console operation.	Perform remote processing operations.
Review console output for job status.	Prepare for output on required medium.
Initiate batched job processing.	Ensure proper care of storage medium.
Determine causes of hardware stops or malfunctions.	Perform back up operations.
Perform minor maintenance on hardware.	Schedule computer room operations.
Interpret and apply instructions from written procedures.	

TABLE IV (CON'T.)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS

BY PROGRAM

PROGRAM: 07.0303 Business Data Entry Occupations

COMPETENCIES:

Convert routine items of information into codes for processing.	Prepare file labels.
Manually record alphabetic or numeric data, and calculates batch totals.	Maintain records of equipment and supply usage.
Receive and review input and output to verify for accuracy and completeness of source documents.	Adhere to file security procedures.
Maintain records and coding systems necessary to process and review document input and output.	Oversee disbursement and/or storage of data processing materials and supplies.
Investigate and correct problems causing incorrect input or output.	Requisition of data processing forms and supplies.
Operate data entry hardware.	Process materials and supplies received.
Perform operator maintenance on data entry hardware.	Use file building techniques and procedures.
Perform transcription of source data into magnetic coded media.	Classify files by their physical properties.
Classify and catalog reels created by system.	Use File maintenance techniques.

TABLE IV (CON'T.)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS

BY PROGRAM

PROGRAM: 07.0304 Business Data Peripheral Equipment Operation	COMPETENCIES:
Change, align or remove paper in printers.	Convert or record data from one media to another media, as card to tape or tape to disk.
Correct stoppages on printers.	Interpret indicator lights on peripheral equipment.
Notify supervisors or management of machine failure, downtime, or processing problems.	Clean or inspect magnetic media.
Correct stoppages on card readers.	Correct stoppages on disk drives.
Power up or power down peripheral hardware.	Burst, decollate, and assemble printed output.
Maintain print quality.	Mount or dismount carriage control tapes (printer).
Correct stoppages on magnetic or paper tape.	Perform start/stop and restart procedures on card punch (with jam clearing).
Mount or dismount magnetic or paper tapes.	Perform start/stop and restart procedures on disk drive.
Load or unload punch cards in or from automatic data processing hardware.	Store and handle reels of magnetic tape.
Load programs or data from media (i.e. cards, disk, tape).	Perform start/stop and restart procedures on card reader.
Respond to or correct errors via peripheral console.	Perform start/stop and restart procedures on disk drive.
Perform operator maintenance on peripheral hardware.	Load and unload a disk drive.
Punch cards.	Determine causes of hardware stops or malfunctions.

TABLE IV (CON'T.)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS

BY PROGRAM

PROGRAM: 07.0304 Business Data Peripheral Equipment Operation (continued)

COMPETENCIES:

Label magnetic media externally.	Perform minor maintenance of hardware.
Notify supervisor of computer operations.	Follow instructions necessary to run job.
Reproduce cards.	Keep logs of hardware problems and recovery procedures.
Interpret and apply instructions from written procedures.	Prepare for output on required medium.
Insure proper care of storage medium.	Correct stoppages on card punch machines.

TABLE IV (CON'T)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS

BY PROGRAM

PROGRAM: 07.0305 Business Data Processing	COMPETENCIES:
Design and code computer programs.	Enter data or programs into computer via a terminal.
Prepare computer routines and programs.	Initiate batched job processing, and convert or record data from one media to another.
Test computer routines and programs using appropriate test data.	Code job control languages.
Document computer routines and programs.	Prepare or revise program specifications.
Prepare system or program test data.	Estimate programming effort based on specifications.
Prepare adequate computer edits of input data.	Desk check programs.
Update program documentation.	Design error handling routines.
Analyze output products for compliance with specifications and standards.	Develop restart procedures in computer programs.
Determine the cause of invalid output and make necessary corrections (debug).	Maintain schedule to ensure completion of programming projects.
Utilize state-of-the-art techniques, such as Top Down Design and Structured Programming.	Prepare or assist in development of operator instructions and related documentation.
Confer with systems analyst and subject matter personnel in preparation of program routines.	Write procedures for use of CRT.
Review existing routines for applicability of new techniques.	Design screen format for CRT.
Analyze and update existing programs.	Program in BASIC.
Program in COBOL.	Program in RPG.

TABLE IV (CON'T.)

OCCUPATIONAL COMPETENCIES TO BE ACQUIRED BY STUDENTS

BY PROGRAM

PROGRAM: 07.0305 Business Data Processing	COMPETENCIES:
	Develop and maintain generalized utility routines for application in appropriate overall programs.

Data For A Framework of Curriculum Development

In addition to the identification and validation of occupational competencies (Table II) for use as a framework for curriculum development for secondary office data processing programs a comparison of the essential elements of the new curriculum (H.B. 246) has been compared with the identified occupational competencies. The relationship of the occupational competencies to the essential elements for the courses of data processing, computer programer I, computer programer II, and computer programer III is presented in Table V. An analysis of Table V reveals that only eight of the sixty-two essential elements have a specific instructional relationship to occupational competencies to be acquired by students preparing for employment in occupations under the categories and CIP titles business data peripheral equipment operation, business data entry equipment operation, and business computer console operation. Table VI reveals that all of the essential elements (75.90) are directly related to CIP 07.0305, Business Data Programming.

TABLE V

OCCUPATIONAL COMPETENCIES

RELATED TO BY ESSENTIAL ELEMENTS
(75.90 Technical)

OCCUPATIONAL COMPETENCIES	RELATED TO BY:			
	Data Processing	Computer Programer		
		I	II	III
Operate data entry hardware.		✓		
Perform transcription of source data into magnetic coded media.				
Classify and catalog reels created by system.				
Prepare file labels.				
Maintain records of equipment and supply usage.				
Adhere to file security procedures.				
Oversee disbursement and/or storage of data processing materials and supplies.				
Requisition of data processing forms and supplies.				
Process materials and supplies received.				
Use file building techniques and procedures.				
Classify files by their physical properties.				
Use file maintenance techniques.				
Change, align or remove paper in printers.				
Correct stoppages on printers.				
Notify supervisors or management of machine failure, downtime, or processing problems.				
Correct stoppages on card readers.				
Power up or power down peripheral hardware.		✓		
Maintain print quality.				
Correct stoppages on magnetic or paper tape.				
Correct stoppages on card punch machines.				
Mount or dismount magnetic or paper tapes.				

TABLE V (CON'T.)

OCCUPATIONAL COMPETENCIES

RELATED TO BY ESSENTIAL ELEMENTS
(75.90 Technical)

OCCUPATIONAL COMPETENCIES	RELATED TO BY:			
	Data Processing	Computer Programer		
		I	II	III
Load or unload punch cards in or from automatic data processing hardware.				
Load programs or data from media (i.e. cards, disk, tape).				
Receive and review input and output to verify for accuracy and completeness of source documents.				
Maintain records and coding systems necessary to process and review document input and output.				
Investigate and correct problems causing incorrect input or output.			✓	✓
Design and code computer programs.	✓	✓	✓	✓
Prepare computer routines and programs.			✓	✓
Test computer routines and programs using appropriate test data.			✓	✓
Document computer routines and programs.			✓	✓
Prepare system or program test data.		✓	✓	✓
Prepare adequate computer edits of input data.				✓
Update program documentation.				✓
Analyze output products for compliance with specifications and standards.				✓
Determine the cause of invalid output and make necessary corrections (debug).	✓	✓	✓	✓
Utilize state-of-the-art techinques, such as Top Down Design and Structured Programming.				
Confer with systems analyst and subject matter personnel in preparation of program routines.				
Develop and maintain generalized utility routines for application in appropriate overall programs.				

TABLE V (CON'T.)

OCCUPATIONAL COMPETENCIES

RELATED TO BY ESSENTIAL ELEMENTS
(75.90 Technical)

OCCUPATIONAL COMPETENCIES	RELATED TO BY:			
	Data Processing	Computer Programer		
		I	II	III
Review existing ro[illegible]s for applicability of new techniques.				
Analyze and update [illegible]rg programs.				✓
Enter data or programs into computer via a terminal.	✓	✓	✓	
Initiate batched job processing, and convert or record data from one media to another.				
Code job control languages.	✓	✓	✓	✓
Prepare or revise program specifications.				
Estimate programming effort based on specifications.				
Estimate programming effort based on specifications.				
Desk check programs.			✓	✓
Design error handling routines.				✓
Develop restart procedures in computer programs.				
Maintain schedule to ensure completion of programming projects.				
Prepare or assist in development of operator instructions and related documentation.				
Write procedures for use of CRT.			✓	✓
Design screen format for CRT.				
Program in BASIC.	✓	✓	✓	✓
Program in COBOL.				✓
Program in PASCAL.				✓
Program in FORTRAN.				✓
Program in RPG.				✓

TABLE V (CON'T.)

OCCUPATIONAL COMPETENCIES

RELATED TO BY ESSENTIAL ELEMENTS
(75.90 Technical)

OCCUPATIONAL COMPETENCIES	RELATED TO BY:			
	Data Processing	Computer Programer		
		I	II	III
Prepare for output on required medium.				
Ensure proper care of storage medium.				
Interpret and apply instructions from written procedures.				
Respond to or correct errors via peripheral console.				
Perform operator maintenance on peripheral hardware.				
Punch cards.				
Label magnetic media externally.				
Notify supervisor of computer operations.				
Reproduce cards.				
Convert or record data from one media to another media, as card to tape or tape to disk.				
Interpret indicator lights on peripheral equipment.				
Clean or inspect magnetic media.				
Correct stoppages on disk drives.				
Burst, decollate, and assemble printed output.				
Mount or dismount carriage control tapes (printer).				
Perform start/stop and restart procedures on card punch (with jam clearing).				
Perform start/stop and restart procedures on card reader.				
Perform start/stop and restart procedures on disk drive.				
Load and unload a disk drive.				
Determine causes of hardware stops or malfunctions.				

TABLE V (CON'T.)

OCCUPATIONAL COMPETENCIES

RELATED TO BY ESSENTIAL ELEMENTS
(75.90 Technical)

OCCUPATIONAL COMPETENCIES	RELATED TO BY:			
	Data Processing	Computer Programer		
		I	II	III
Perform minor maintenance of hardwares.				
Follow instructions necessary to run job.				
Keep logs of hardware problems and recovery procedures.				
Perform restart procedures on computer hardware system.		✓	✓	✓
Perform restart procedures on computer software system.				
Respond to or correct errors via console operation.				
Review console output for job status.				
Initiate batched job processing.				
Determine causes of hardware stops or malfunctions.				
Perform minor maintenance on hardware.				
Follow instructions necessary to run job.				
Keep logs of runs and job status.				
Keep logs of hardware problems and recovery procedures.				
Mount/dismount magnetic disk.				
Use operational control language.	✓	✓	✓	✓
Use system utilities to produce desired results.				
Perform remote processing operations.				
Prepare for output on required medium.				
Ensure proper care of storage medium.				
Perform backup operations.				

TABLE V (CON'T.)

OCCUPATIONAL COMPETENCIES

RELATED TO BY ESSENTIAL ELEMENTS
(75.90 Technical)

OCCUPATIONAL COMPETENCIES	RELATED TO BY:			
	Data Processing	Computer Programer		
		I	II	III
Schedule computer room operations.				
Interpret and apply instructions from written procedures.				
Convert routine items of information into codes for processing.				
Manually record alphabetic or numeric data, and calculates batch totals.				
Perform software system initialization procedures.				
Interact with hardware system via console with software				
Power up CPU	✓	✓	✓	✓
Power down CPU.	✓	✓	✓	✓

TABLE VI

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
a) Data processing (1,2, or 3 units) shall include the following essential elements:				
(1) Concepts and skills related to general data processing. The student shall be provided opportunities to:				
(A) demonstrate comprehension of data processing terms;	✓			✓
(B) understand aspects of input and output; and	✓			✓
(C) understand the major components of data processing systems.	✓			✓
(2) Concepts and skills related to data entry. The student shall be provided opportunities to understand and demonstrate the use of data entry equipment.	✓	✓	✓	✓
(3) Concepts and skills related to programming and languages. The student shall be provided opportunities to:				
(A) apply the concepts of logic to programming problems;	✓			
(B) translate the applied solution into a common programming language; and	✓			
(C) demonstrate the ability to debug and audit a solution.	✓			
(4) Concepts and skills related to data representation and storage. The student shall be				

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TABLE VI (CON'T.)

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
provided opportunities to:				
(A) demonstrate knowledge of computer numbering systems data codes, and basic concepts of data storage; and	✓			
(B) establish random and sequential file structures.	✓			
(5) Concepts and skills related to computer operations. The student shall be provided opportunities to:				
(A) demonstrate the use of computer equipment;	✓			✓
(B) demonstrate the use of job control language; and	✓			✓
(C) schedule and process requests to minimize the operational steps and run time.	✓			✓
b) Computer programmer I (1 unit) shall be a laboratory-oriented course which includes the following essential elements:				
(1) Concepts and skills related to general data processing. The student shall be provided opportunities to:				
(A) demonstrate comprehension of data processing terms:	✓			
(B) understand the major components of data processing systems;	✓			

TABLE VI (CON'T.)

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
(C) understand aspects of input and output; and	✓			
(D) demonstrate knowledge of computer numbering systems and addressing techniques.	✓			
(2) Concepts and skills related to hardware component utilization. The student shall be provided opportunities to:				
(A) become familiar with terminal keyboard;	✓		✓	✓
(B) categorize hardware according to size, application, and configuration;				
(C) practice turn on, sign on, and unloading procedures; and	✓		✓	✓
(D) explore future hardware developments.	✓			
(3) Concepts and skills associated with programming and languages. The student shall be provided opportunities to:				
(A) understand what a computer program is;	✓			
(B) distinguish between batch and online systems;	✓			
(C) acquire understanding of computer language constructs;	✓			
(D) translate problems into logical steps using graphic techniques;	✓			
(E) apply graphic solutions to a common programming language;	✓			
(F) demonstrate the ability to debug and audit a solution;	✓			

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TABLE VI (CON'T.)

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
(G) become acquainted with job control language; and	✓			
(H) demonstrate the ability to predict output of a given program.	✓			
(4) Concepts and skills associated with data storage. The student shall be provided opportunities to:				
(A) differentiate between various types of permanent data storage devices;	✓			
(B) understand methods of storage within devices;	✓			
(C) create a program to retrieve data from an existing file; and	✓			
(D) maintain a data file.	✓			
c) Computer programmer II (2-3 units) shall be a laboratory-oriented course which includes the following essential elemerts:				
(1) Concepts and skills related to application system development. The student shall be provided opportunities to:				
(A) demonstrate comprehension of the system development process;	✓			
(B) analyze a problem;	✓			
(C) design a solution;	✓			
(D) program and test the solution; and	✓			
(E) develop an understanding of the implementation process.	✓			

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TABLE VI (CON'T.)

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
(2) Concepts and skills related to language application. The student shall be provided opportunities to:				
(A) establish random and sequential files;	✓			
(B) develop an understanding of procedure, subroutine, and function;	✓			
(C) translate graphic solutions into major structural elements of a program;	✓			
(D) translate graphic solutions into language statements for the input, editing, processing, and output procedures; and	✓			
(E) develop facility in use of job control language.	✓			
(3) Concepts and skills related to testing. The student shall be provided opportunities to:				
(A) develop test data and testing techniques	✓			
(B) run tests on programs and on the system; and	✓			
(C) gain an awareness of the implementation of a system into production status;	✓			
(D) develop understanding of the programmer responsibilities involved in system maintenance; and	✓			
(E) understand various input and output media (mark sense sheets, microfiche, etc.) and their appropriate use.	✓			
(4) Concepts and skills associated with implemen-				

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TABLE VI (CON'T.)

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
tation and maintenance of the system. The student shall be provided opportunities to:				
(A) write documentation for maintaining the system;	✓			
(B) develop an understanding of preparing user documentation;	✓			
(C) gain an awareness of the implementation of a system into production status;	✓			
(D) develop understanding of the programmer responsibilities involved in system maintenance; and	✓			
(E) understand various input and output media (mark sense sheets, microfiche, etc.) and their appropriate use.	✓			
d) Computer programmer III (2-3 units) shall be cooperative or internship training program that includes the following essential elements:				
(1) Concepts and skills related to advanced programming techniques. The student shall be provided opportunities to:				
(A) develop skills in writing structured code;	✓			
(B) understand the concepts of modular programming;	✓			
(C) develop data entry screens and menus for online systems;	✓			
(D) gain knowledge of advanced file access methods; and	✓			

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TABLE VI (CON'T.)

APPLICATION OF ESSENTIAL ELEMENTS TO BUSINESS (OFFICE)

DATA PROCESSING PROGRAMS

ESSENTIAL ELEMENTS (75.90)	Business Data Processing Programs			
	Business Data Programing (07.0305)	Business Data Peripheral Operation (07.0304)	Business Data Entry Equipment Operation (07.0303)	Business Computer and Console Operation (07.0302)
(E) develop a small application using a data base management system.	✓			
(2) Concepts and skills associated with programs development tools. The student shall be provided opportunities to:				
(A) become familiar with the functions of an operating system;	✓			
(B) develop facility in the use of other programming development tools and utilities; and	✓			
(C) investigate tools, information, and other services provided by the system programmer function.	✓			
(3) Concepts and skills related to other functions of the data processing and user organizations. The student shall be provided opportunities to:				
(A) become familiar with other support functions of the data processing organization;	✓	✓	✓	✓
(B) understand how the user organization collects data input and uses system output; and	✓			
(C) gain knowledge of project management techniques related to system development.	✓			

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Chapter IV

CONCLUSIONS AND IMPLICATIONS

The overall purpose of this project was to determine necessary student and instructor competencies in the area of secondary vocational office data processing programs. The focus of the project was to assess the need for professional development and/or preparation of secondary vocational office data processing instructors and to validate occupational competencies to be acquired by students completing secondary vocational office data processing programs.

CONCLUSIONS

Findings or products of the study relative to the objectives of the project were reported in Chapter III. Based on the products developed and the review of the literature these conclusions were drawn.

1. There is a need for the professional improvement of instructors of the secondary data processing program as evidenced by an analysis of the responses to the professional needs assessment survey.

2. Secondary office data processing instructors, should have a mastery of the subject being taught. The subject matter competencies to be demonstrated by instructors of the programs have been determined.

3. There will be a continued need for instruction in secondary vocational office data processing programs for the growing job opportunities for the clerical occupations in the area of business/office data processing.

4. The majority of job opportunities for high school completers of programs in data processing will be in occupations classified as office and/ or clerical.

5. Secondary data processing programs have been placed under the vocational instructional program area of technical education. However, based on follow up reports, less than ten percent of the job opportunities open to high school graduates will be classified as technical by OES survey codes and by the current Texas Education Agency document A Classification of Instructional Programs For Occupational Education and Technology and the U.S. Department of Education document A Classification of Instructional Programs.

6. Specific competencies and the amount of time necessary for training for each occupation within the each of the vocational instructional programs of secondary office data processing provide guidance for determining the length (hours) necessary for developing knowledge and skills

(competencies) for entry level employment.

7. As of May 1984, Chapter 74 of the Texas Administrative Code (Curriculum) does not list essential elements for the vocational office data processing programs: (1) business data peripheral equipment operations; (2) business data entry equipment operation; and (3) business computer and console operation.

IMPLICATIONS

The findings of this project in terms of project products imply that there should be a continued emphasis on meeting data processing labor market needs open to qualified high school graduates through improved vocational office data processing programs of: (1) Business Computer and Console Operation, (2) Business Data Entry Equipment Operation; (3) Business Data Peripheral Equipment Operation; and (4) Business Data Programer (the occupation of detail programer). The quality of secondary business (office) data processing programs will improve by activities designed to meet the assessed professional needs of the instructors and curriculum guides and materials being developed for the list of validated occupational competencies to be acquired by students completing the instructional programs identified above. For proper preparation of students to obtain entry level employment, courses and programs must have content based on the occupational competencies and classes must be scheduled based on the identified training time required for each occupation.

Chapter V

Appendices

Appendix A

Questionnaire used to Identify Professional

Competency/Knowledge

Teaching Tasks of
Secondary Data Processing Teachers

Following are teaching tasks which are performed by secondary data processing teachers. The panel will evaluate each task statement to determine if it should remain on the list. If one panel member feels that the task is performed by data processing instructors, the statement will remain on the list. Space is provided on attached sheets for making additions to the list of teaching tasks.

If you know of tasks which should be added, please write them on the sheets provided. Please add the task on the respective sheet by teacher function (i.e. Program, Planning, Development; Instruction: Execution).

Program Planning, Development, and Evaluation

1. Organize a steering committee to assist in the pre-planning activities of an occupational survey.
2. Identify the geographical area in which an occupational survey will be conducted.
3. Appoint and involve advisory committee in conducting an occupational survey.
4. Collect occupational data from employers to identify occupational standards.
5. Identify the role and function of the advisory committee.
6. Plan the annual agenda to be considered by the advisory committee.
7. Assist in the identification of the vocational education purposes and objectives for the school.
8. Analyze occupations with assistance of employers and labor representatives.
9. Identify the competencies needed for entry into an occupation.
10. Assist in writing general objectives for courses offered in the vocational education program.
11. Write student performance goals for vocational education courses.
12. Maintain continual follow-up information on placement, employment, and training status of each graduate of the vocational program.
13. Disseminate a summary of the vocational education evaluation to administrators, advisory committee members, and the board of education.
14. Obtain follow-up information on handicapped students leaving or graduating from school programs.

Instruction: Planning

15. Make a job analysis for determination of instructional content in the course taught.

16. Define training requirements.

17. Plan or schedule programs.

18. Review teaching materials.

19. Write job proficiency guides.

20. Develop a course of study.

21. Determine group and individual learning experiences for the unit based on individual differences of students.

22. Prepare a lesson plan.

23. Identify textbook, reference, and other instructional material.

24. Develop original instructional materials.

25. Assist in a long-range plan for integrating the handicapped student into the vocational educational program.

26. Define appropriate expectations for laboratory and cooperative work performance of handicapped persons.

27. Identify needs and interests of the handicapped student.

28. Conduct parent/teacher conferences for planning instructional programs.

29. Revise selection criteria to ensure program accessibility for handicapped students.

30. Develop an integrated program for each handicapped student in cooperation with special education teachers and other school personnel.

31. Develop instructional activities by clustering and sequencing related tasks according to individual handicapped students' interests, abilities, and needs.

32. Select, adapt, or develop instructional materials for use with handicapped students.

33. Develop instructional units revolving around job-specific concepts and skills and the needs and abilities of handicapped students.

34. Devise flexible time limits based upon individual rates of progress.

35. Utilize information obtained from related disciplines about the sensory, physical, emotional, social, and cognitive abilities of the student to plan progress.

36. Develop an awareness of how to recognize students with learning problems in the regular class.

37. Use diagnostic and prescriptive assessment techniques for planning instruction.

38. Identify the services needed to increase handicapped students' chances of being successful in regular programs.

39. Assist in the development of individualized education programs (IEP) for handicapped students.

Instruction: Evaluation

40. Establish criteria for evaluating student performance.

41. Develop criterion test.

42. Formulate a system of grading consistent with school policy.

43. Conduct a comprehensive evaluation of the total vocational program as it relates to the needs of handicapped students.

44. Evaluate a student performance according to the objectives on the indivudualized education plan (IEP).

45. Determine appropriate techniques for evaluating the performance of students with specific handicaps.

46. Develop behavior observation skills concerning handicapped students.

47. Appraise students' performance in relation to performance objectives.

48. Evaluate student-learner's work qualities, personal traits, and progress on the job.

49. Devise self-evaluation technique for use by students.

Instruction: Execution

50. Conduct field trips.

51. Provide students with opportunities to become experienced in manipulative skills.

52. Teach lesson using conference technique.

53. Teach lesson by the project or job method.

54. Provide students with opportunities to apply new information while under supervision of instructor.

55. Obtain summary for a lesson.

56. Provide instruction so that students can progress at own rate of speed.

57. Teach a demonstration lesson.

58. Give a lecture.

59. Give an illustrated talk.

60. Utilize a variety of teaching methods and techniques to provide instruction for the handicapped students.

61. Demonstrate objectivity and sensitivity to cultural differences of handicapped students.

62. Apply individual instructional prescription to all handicapped pupils in class.

63. Use the basic principles of learning theory and behavior modification related to vocational instruction for the handicapped.

64. Interact positively and naturally with the handicapped student.

65. Emphasize qualities of initiative, self-reliance, and independence with the handicapped learner.

66. Modify instructional materials and equipment for individual handicapped learner's needs.

67. Develop a procedure for fulfilling an individual instructional prescription in the classroom and laboratory situation.

68. Translate statements describing physical and sensory limitations into statements concerning instructional limitations and/or adaptations.

69. Sequence tasks to conform with learning styles, learning pace, and inferred learning potential of handicapped students.

70. Provide teaching strategies and delivery systems based upon individual learning styles and abilities of handicapped students.

71. Revise methods of performing tasks.

72. Develop appropriate attitudes of non-handicapped students toward handicapped students.

Program Management

73. Secure related services for handicapped students necessary to provide the total quality aspects of the program.

74. Modify or adapt when necessary the tools, equipment, facilities, or conditions in the learning environment to meet the needs of the handicapped student.

75. Prepare a capital outlay budget proposal for new equipment needed in a vocational course.

76. Plan an operating budget proposal for consumable supplies, services, and materials needed in a vocational course.

77. Prepare purchase request for approved vocational equipment and supplies.

78. Structure a filing system for records and report forms used in a vocational course.

79. Supply administrators with data for vocational reports required by the state department of education.

80. Provide approved safety apparel and devices for vocational students assigned to hazardous equipment.

81. Maintain a record of safety instruction presented in compliance with safety laws and regulations.

82. Uphold acceptable standards of student behavior in vocational classooms and laboratories.

83. Maintain an inventory of vocational tools, supplies, and equipment assigned to the laboratory.

84. Establish a system for repairing and servicing tools and equipment in a vocational laboratory.

85. Arrange for the storage and security of vocational supplies and equipment.

86. Implement student "check-out" procedures for tools, supplies, and equipment used in the vocational laboratory.

87. Schedule laboratory equipment for maximum utilization by students.

88. Direct students in a system for cleaning and maintaining the vocational laboratory.

89. Arrange layout of vocational laboratory to simulate or duplicate occupational environment.

90. Debug computer programs.

91. Load programs or data from cards.

92. Prepare or update individual training records.

93. Compile or assemble programs.

94. Input, update, or retrieve data using remote inquiry units, such as cathode-ray tubes (CRT).

95. Initiate batched job processing.

96. Determine causes of program halts or abends.

97. Code computer programs in higher level languages.

98. Analyze output products for compliance with standards or specifications.

99. Design input or output formats such as card formats.

100. Develop or improve ADP work methods or procedures.

101. Adjust read or sensing devices in data processing equipment.

102. Develop directives governing ADP equipment usage.

103. Coordinates repair of ADPE with maintenance personnel.

104. Inspects equipment, supplies, and work areas.

105. Monitors temperature and humidity of computer facilities.

106. Establishes daily program run priorities.

107. Informs OPR of input data errors.

108. Isolates causes of machine stops or malfunctions.

109. Operates other data processing equipment, such as card punches, readers, interpreters, sorters, and decollators.

110. Assists in troubleshooting problems occuring on production runs.

111. Insures that output is timely, accurate, and conforms to established procedures.

112. Completes machine utilization records.

113. Prepares recommendations for equipment acquisition or replacement.

114. Insures availability of necessary supplies for effective operation.

115. Improves work methods and procedures to insure full use of information.

116. Supervises maintenance of utilization records of data processing equipment.

117. Reviews completed data reports and programs for accuracy, adequacy, and compliance with instructions.

118. Observes equipment operations to insure conformance with established standards.

119. Rates students for performance.

120. Makes periodic evaluations, notes discrepancies and recommends corrective actions.

121. Supervises production control tasks.

School/Community Relations

122. Assist parents and other teachers in interpreting vocational programs and services for the handicapped student.

123. Identify and provide orientation for potential employers of handicapped students.

124. Cooperate with appropriate agencies and groups in identifying career opportunities for the handicapped student.

125. Influence attitudes of regular school personnel and non-handicapped students toward acceptance of handicapped students.

126. Maintain liaison with union officials and employers.

127. Conduct opinion surveys in the school and community concerning the vocational program.

128. Analyze enrollment trends to determine student and parent acceptance of the vocational program.

129. Obtain informal feedback on the vocational program through contacts with individuals in the school and community.

130. Consult advisory committee to obtain information concerning their expectations of the vocational program.

131. Acquire information from members of the community power structure regarding their expectations of the vocational program.

132. Assist in planning the overall objectives of the total school program.

Student Guidance

133. Assist the handicapped student in viewing his/her assets and limitations realistically.

134. Assist in identifying school vocational education purposes and goals for the handicapped student.

135. Advise and counsel handicapped persons relative to personal and professional goals.

136. Counsel parents/guardians of handicapped students regarding their child's vocational education and career plans.

137. Interpret occupational tests and inventories to students.

138. Develop two-way communication during conferences with handicapped students.

139. Assist handicapped students in developing good study habits related to vocational training.

140. Conduct a purposeful home and community visit for each handicapped student.

141. Assess the ability of the handicapped individual to modify his/her behavior.

142. Assist in developing suitable job placement for handicapped students.

143. Assist each handicapped student to develop and maintain a positive self-concept.

144. Determine students' background and environment.

145. Develop constructive working relationships among students.

146. Encourage students to discuss career aspirations.

147. Demonstrate a regard for and an interest in the students as individuals.

148. Interpret occupational tests and inventories to students.

149. Assist students in determining ways to best describe their saleable skills.

150. Work with other teachers and counselors to help students with individual problems.

151. Establish communication patterns for exchanging information and for cooperating with the guidance counselor.

152. Present information to students on employment opportunities.

153. Present information to students on post-high school training and educational opportunities available to them.

154. Assist students in securing and in filling out applications for jobs, scholarships, educational loans, or college admission.

155. Assist handicapped students in developing social, physical, and emotional security needed for obtaining and maintaining future employment.

Professional Role and Development

156. Identify types of barriers (i.e., attitudinal, architectural, et cetera) that have inhibited training and employment of handicapped persons.

157. Make basic recommendations to ensure the accessibility and safety of a facility for handicapped persons.

158. Use and supervise service personnel in providing vocational training for handicapped persons.

159. Identify and participate in professional organizations concerned with handicapped persons.

160. Maintain ethical and legal standards appropriate for working with handicapped students.

161. Analyze personal and professional abilities and limitations in providing instruction to handicapped persons.

162. Communicate effectively with other professionals to solve problems of the handicapped student.

163. Refer students with special problems to appropriate sources.

164. Identify current trends of the teaching profession.

165. Promote the attainment of the goals and objectives of the teaching profession.

166. Participate in experimental and other data collecting research activities.

167. Evaluate your personal and professional abilities and limitations.

168. Acquire new occupational skills needed to keep pace with technological advancement in your teaching field.

169. Supervise student teachers.

170. Uphold and advocate laws regulating child care facilities and child abuse.

171. Serve as a leader in planning and carrying out community professional workshops.

172. Evaluate child development staff performance.

173. Identify and make available professional resources within the community and state.

174. Identify professional organizations in which membership would be desirable for professional child development personnel.

175. Work with other Child Development Programs within the state in developing a common philosophy.

176. Interview and assist in selection of staff.

177. Plan short-term staff improvement (continuing education or noncredit courses).

178. Teach short-term staff improvement classes.

179. Serve as a Child Development Associate Trainer for students seeking the CDA Credential.

180. Maintain records on background, professional attributes and goals of staff members.

Student Organizations

181. Demonstrate a personal commitment concerning handicapped students' participation in student vocational organizations.

182. Integrate and actively involve handicapped students into an ongoing student vocational organization.

183. Prepare handicapped students for leadership roles in student vocational organizations.

184. Provide handicapped students with opportunities for a wide range of social experiences through vocational student organizations.

185. Obtain approval from school administration for establishing a student vocational organization.

186. Contact state leadership regarding the steps to be followed in organizing a student vocational organization.

187. Acquaint prospective members and their parents with the purposes, activities, and values of the student vocational organizaiton.

188. Organize a student committee to assess the interest of students in joining a vocational organization.

189. Conduct an organizational meeting for a student vocational organization.

190. Coordinate student vocational organization activities with instructional activities.

191. Supervise the development of an annual handbook and scrapbook for the student vocational organization.

192. Maintain a file of publications available for the student vocational organization.

193. Maintain student vocational organization as integral part of the instructional vocational education program.

194. Serve as an advisor or judge for district, state, regional, or national student vocational organization contests.

195. Participate in state, district, regional, and national activities of the student vocational organization.

Coordinators
(To be completed by Teacher-Coordinators
of Cooperative Training Programs)

196. Establish criteria for selection of student-learners.

197. Provide prospective student-learners with resource materials on occupational opportunities to aid them in selecting a vocation.

198. Identify a prospective student-learner on basis of selection criteria and data.

199. Match a student-learner's unique characteristics with an appropriate training station.

200. Select student-learner training stations.

201. Arrange with a union to make contract provision for student-learners.

202. Establish criteria to evaluate and approve training stations.

203. Assess training capability of the prospective training station.

204. Assess educational adequacy of a prospective training station's facilities and equipment.

205. Assess safety provision of facilities and equipment of the prospective training stations.

206. Develop systematic training plan and agreement.

207. Supervise student-learner's on-the-job experience.

208. Develop a training plan for student-learner with employer.

209. Sponsor employer/student-learner banquet for the vocational program.

210. Obtain from advisory committee information on ways to improve related instruction and on-the-job training.

211. Establish criteria for seleciton of student-learners.

212. Provide prospective student-learners with resource materials on occupational opportunities to aid them in selecting a vocation.

213. Identify a prospective student-learner on basis of selection criteria and data.

214. Match a student-learner's unique characteristics with an appropriate training station.

215. Select student-learner training stations.

216. Arrange with a union to make contract provision for student-learners.

217. Establish criteria to evaluate and approve training stations.

218. Assess training capability of the prospective training station.

219. Assess educational adequacy of a prospective training station's facilities and equipment.

220. Assess safety provision of facilities and equipment of the prospective training stations.

221. Develop systematic training plan and agreement.

222. Supervise student-learner's on-the-job experience.

223. Develop a training plan for student-learner with employer.

224. Sponsor employer/student-learner banquet for the vocational program.

225. Obtain from advisory committee information on ways to improve related instruction and on-the-job training.

226. Uphold acceptable standards of student behavior in field sites.

227. Review course content with the field site staff.

228. Complete a cooperative training agreement unique to meeting the needs of the individual handicapped.

229. Select cooperative training stations for individual handicapped learners.

ADDITIONS

Program Planning, Development, and Evaluation

ADDITIONS

Instruction: Planning

ADDITIONS

Instruction: Evaluation

ADDITIONS

Instruction: Execution

ADDITIONS

Program Management

ADDITIONS

School/Community Relations

ADDITIONS

Student Guidance

ADDITIONS

Professional Role and Development

ADDITIONS

Student Organizations

ADDITIONS

Coordinators

Appendix B

Professional Needs Assessment Survey Instrument

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH

SECTION I. Competencies Needed for Teaching All Students

PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (4-29)

1. Participate on a steering committee to assist in the pre-planning activities of an occupational survey.	1 2 3 4 5	1 2 3 4 5
2. Identify the geographical area in which an occupational survey will be conducted.	1 2 3 4 5	1 2 3 4 5
3. Appoint and involve advisory committee in conducting an occupational survey.	1 2 3 4 5	1 2 3 4 5
4. Collect occupational data from employers to identify occupational training.	1 2 3 4 5	1 2 3 4 5
5. Identify the role and function of the advisory committee.	1 2 3 4 5	1 2 3 4 5
6. Develop an annual plan to be considered by the advisory committee.	1 2 3 4 5	1 2 3 4 5
7. Assist in the identification of the vocational education purposes and objectives for the school.	1 2 3 4 5	1 2 3 4 5
8. Analyze occupations with assistance of employers and labor representatives.	1 2 3 4 5	1 2 3 4 5
9. Identify the competencies needed for entry into an occupaton.	1 2 3 4 5	1 2 3 4 5
10. Assist in writing general objectives for courses offered in the vocational education program.	1 2 3 4 5	1 2 3 4 5
11. Write student performance goals for vocational education courses.	1 2 3 4 5	1 2 3 4 5
12. Maintain follow-up information on placement, employment, and training status of each graduate of the vocational program.	1 2 3 4 5	1 2 3 4 5
13. Disseminate a summary of the vocational education evaluation to administrators, advisory committee members, and the board of education.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (30-61)		
14. Make a task analysis to correlate instructional content in course taught with identified job competencies within the field.	1 2 3 4 5	1 2 3 4 5
15. Define training requirements.	1 2 3 4 5	1 2 3 4 5
16. Plan programs.	1 2 3 4 5	1 2 3 4 5
17. Review teaching materials.	1 2 3 4 5	1 2 3 4 5
18. Write job proficiency guides.	1 2 3 4 5	1 2 3 4 5
19. Develop a course of study.	1 2 3 4 5	1 2 3 4 5
20. Determine group and individual learning experiences for the unit based on individual differences of students.	1 2 3 4 5	1 2 3 4 5
21. Prepare lesson plans.	1 2 3 4 5	1 2 3 4 5
22. Identify textbook, reference, and other instructional material.	1 2 3 4 5	1 2 3 4 5
23. Develop original instructional materials.	1 2 3 4 5	1 2 3 4 5
24. Assist in a long-range plan for integrating the students into the vocational educational program.	1 2 3 4 5	1 2 3 4 5
25. Define appropriate expectations for laboratory or cooperative work performance of student.	1 2 3 4 5	1 2 3 4 5
26. Identify needs and interests of the students.	1 2 3 4 5	1 2 3 4 5
27. Conduct parent/teacher conferences for planning instructional programs.	1 2 3 4 5	1 2 3 4 5
28. Develop instructional units revolving around job-specific concepts and skills and the needs and abilities of students.	1 2 3 4 5	1 2 3 4 5
29. Identify concepts of the need for flexible time limits based upon individual rates of progress.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (62-79)		
30. Utilize information obtained from related disciplines about the sensory, physical, social, emotional, and cognitive abilities of the student to plan progress.	1 2 3 4 5	1 2 3 4 5
31. Develop an awareness of how to recognize students with learning problems in the regular class.	1 2 3 4 5	1 2 3 4 5
32. Use diagnostic and prescriptive assessment techniques for planning instruction.	1 2 3 4 5	1 2 3 4 5
33. Identify the services needed to increase students' chances of being successful in programs.	1 2 3 4 5	1 2 3 4 5
34. Establish criteria for evaluating student performance.	1 2 3 4 5	1 2 3 4 5
35. Develop criterion reference lists for instructional units.	1 2 3 4 5	1 2 3 4 5
36. Formulate a system of grading consistent with school policy	1 2 3 4 5	1 2 3 4 5
37. Develop behavior observation skills.	1 2 3 4 5	1 2 3 4 5
38. Appraise students' performance in relation to performance objectives.	1 2 3 4 5	1 2 3 4 5 [1] (80) (4-15)
39. Evaluate student-learner's work qualities, personal traits, and progress on the job.	1 2 3 4 5	1 2 3 4 5
40. Devise self-evaluation techiques for use by students.	1 2 3 4 5	1 2 3 4 5
41. Conduct field trips.	1 2 3 4 5	1 2 3 4 5
42. Provide students with opportunities to become experienced in manipulative skills.	1 2 3 4 5	1 2 3 4 5
43. Teach lesson using conference technique.	1 2 3 4 5	1 2 3 4 5
44. Teach lesson by the project or job method.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (16-43)		
45. Provide students with opportunities to apply new information while under supervision of instructor.	1 2 3 4 5	1 2 3 4 5
46. Provide instruction so that students can progress at a reasonable rate of speed.	1 2 3 4 5	1 2 3 4 5
47. Teach by demonstration method.	1 2 3 4 5	1 2 3 4 5
48. Teach by lecture.	1 2 3 4 5	1 2 3 4 5
49. Teach using an illustrated talk.	1 2 3 4 5	1 2 3 4 5
50. Utilize a variety of teaching methods and techniques to provide instruction for the student.	1 2 3 4 5	1 2 3 4 5
51. Demonstrate objectivity and sensitivity to cultural differences.	1 2 3 4 5	1 2 3 4 5
52. Apply individual instructional prescription to all pupils in the class.	1 2 3 4 5	1 2 3 4 5
53. Use the basic principles of learning theory and behavior modification related to vocational instruction.	1 2 3 4 5	1 2 3 4 5
54. Interact positively and naturally with the student.	1 2 3 4 5	1 2 3 4 5
55. Emphasize qualities of initiative, self-reliance and independence.	1 2 3 4 5	1 2 3 4 5
56. Sequence tasks to conform with learning styles, learning pace, and inferred learning potential.	1 2 3 4 5	1 2 3 4 5
57. Provide teaching strategies and delivery systems based upon individual learning styles and abilities.	1 2 3 4 5	1 2 3 4 5
PROGRAM MANAGEMENT		
58. Secure related services for students necessary to provide the total quality aspects of the program.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM MANAGEMENT		(44-69)
59. Prepare a capital outlay budget proposal for new equipment and supplies.	1 2 3 4 5	1 2 3 4 5
60. Plan an operating budget proposal for consumable supplies, services, and materials needed in a vocational course.	1 2 3 4 5	1 2 3 4 5
61. Prepare purchase requests for approved vocational equipment and supplies.	1 2 3 4 5	1 2 3 4 5
62. Structure a filing system for records and report forms used in a vocational course.	1 2 3 4 5	1 2 3 4 5
63. Supply administrators with data for vocational reports required by the State Department of Education.	1 2 3 4 5	1 2 3 4 5
64. Make basic recommendations to ensure the accessibility and safety of a facility for students.	1 2 3 4 5	1 2 3 4 5
65. Uphold acceptable standards of student behavior in vocational classrooms and laboratories.	1 2 3 4 5	1 2 3 4 5
66. Maintain an inventory of vocational supplies and equipment assigned to the laboratory.	1 2 3 4 5	1 2 3 4 5
67. Establish a system for repairing and servicing equipment in a vocational laboratory.	1 2 3 4 5	1 2 3 4 5
68. Arrange for the storage and security of vocational supplies and equipment.	1 2 3 4 5	1 2 3 4 5
69. Implement student "check-out" procedures for supplies and equipment used in the vocational laboratory.	1 2 3 4 5	1 2 3 4 5
70. Schedule equipment for maximum utilization by students.	1 2 3 4 5	1 2 3 4 5
71. Direct students in system for cleaning and maintaining the vocational laboratory.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM MANAGEMENT (70-79)		
72. Arrange layout of vocational laboratory to simulate or duplicate occupational environment.	1 2 3 4 5	1 2 3 4 5
73. Observe equipment operations to insure conformance with established standards.	1 2 3 4 5	1 2 3 4 5
74. Rate students for performance.	1 2 3 4 5	1 2 3 4 5
75. Make periodic evaluations, note discrepancies and recommend corrective actions.	1 2 3 4 5	1 2 3 4 5
76. Demonstrate knowledge of state and local purchasing policies.	1 2 3 4 5	1 2 3 4 5 2 (80)
SCHOOL/COMMUNITY RELATIONS (4-19)		
77. Assist parents and other teachers in interpreting vocational programs and services.	1 2 3 4 5	1 2 3 4 5
78. Identify and provide orientation for potential employers of students.	1 2 3 4 5	1 2 3 4 5
79. Cooperate with appropriate agencies and groups in identifying career opportunities for the student.	1 2 3 4 5	1 2 3 4 5
80. Maintain liaison with labor, management and employers.	1 2 3 4 5	1 2 3 4 5
81. Analyze enrollment trends to determine student and parent acceptance of the vocational program.	1 2 3 4 5	1 2 3 4 5
82. Recognize and utilize techniques of informal feedback in summarizing the vocational program through contacts with individuals in the school or community.	1 2 3 4 5	1 2 3 4 5
83. Consult advisory committee to obtain information concerning their expectations of the vocational program.	1 2 3 4 5	1 2 3 4 5
84. Assist in planning the overall objectives of the total school program.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
STUDENT GUIDANCE		(20-49)
85. Assist the student in viewing his/her assets and limitations realistically.	1 2 3 4 5	1 2 3 4 5
86. Assist in identifying school vocational education purposes and goals for the student.	1 2 3 4 5	1 2 3 4 5
87. Advise and counsel persons relative to personal and professional goals.	1 2 3 4 5	1 2 3 4 5
88. Counsel parents/guardians of students regarding their child's vocational education and career plan.	1 2 3 4 5	1 2 3 4 5
89. Interpret occupational tests and inventories to students.	1 2 3 4 5	1 2 3 4 5
90. Develop two-way communication during conferences with students.	1 2 3 4 5	1 2 3 4 5
91. Assist students in developing good study habits related to vocational training.	1 2 3 4 5	1 2 3 4 5
92. Assess the ability of the individual to modify his/her behavior.	1 2 3 4 5	1 2 3 4 5
93. Assist in developing suitable job placement for students.	1 2 3 4 5	1 2 3 4 5
94. Assist each student to develop and maintain a positive self-concept.	1 2 3 4 5	1 2 3 4 5
95. Determine students' background and environment.	1 2 3 4 5	1 2 3 4 5
96. Develop constructive working relationships among students.	1 2 3 4 5	1 2 3 4 5
97. Encourage students to discuss career aspirations.	1 2 3 4 5	1 2 3 4 5
98. Demonstrate a regard for and an interest in the students as individuals.	1 2 3 4 5	1 2 3 4 5
99. Assist students in determining ways to best describe their saleable skills.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
STUDENT GUIDANCE (50-73)		
100. Work with other teachers and counselors to help students with individual problems.	1 2 3 4 5	1 2 3 4 5
101. Establish communication patterns for exchanging information and for cooperating with the guidance counselor.	1 2 3 4 5	1 2 3 4 5
102. Present information to students on employment opportunities.	1 2 3 4 5	1 2 3 4 5
103. Present information to students on post-high school training and education opportunities available to them.	1 2 3 4 5	1 2 3 4 5
104. Assist students in securing and in filling out applications for jobs, scholarships, educational loans, or college admission.	1 2 3 4 5	1 2 3 4 5
105. Assist students in developing social, physical, and emotional security needed for obtaining and maintaining future employment.	1 2 3 4 5	1 2 3 4 5
PROFESSIONAL ROLE AND DEVELOPMENT		
106. Identify and participate in professional organizations concerned with students.	1 2 3 4 5	1 2 3 4 5
107. Maintain ethical and legal standards appropriate for working with students.	1 2 3 4 5	1 2 3 4 5
108. Analyze personal and professional abilities and limitations in providing instruction to students.	1 2 3 4 5	1 2 3 4 5
109. Communicate effectively with other professionals to solve problems of the student.	1 2 3 4 5	1 2 3 4 5
110. Refer students with special problems to appropriate sources.	1 2 3 4 5	1 2 3 4 5
111. Identify current trends of the teaching profession.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROFESSIONAL ROLE AND DEVELOPMENT		(74-79)
112. Promote the attainment of the goals and objectives of the teaching profession.	1 2 3 4 5	1 2 3 4 5
113. Participate in experimental and other data collecting research activities.	1 2 3 4 5	1 2 3 4 5
114. Evaluate your personal and professional abilities and limitations.	1 2 3 4 5	1 2 [3] 4 5 (80) (4-23)
115. Acquire new occupational skills needed to keep pace with technological advancement in your teaching field.	1 2 3 4 5	1 2 3 4 5
116. Supervise student teachers.	1 2 3 4 5	1 2 3 4 5
117. Serve as a leader in planning and carrying out community professional workshops.	1 2 3 4 5	1 2 3 4 5
118. Identify and establish accessiblity to professional resources within the community and state.	1 2 3 4 5	1 2 3 4 5
119. Plan short-term staff improvement and/or continuing education programs.	1 2 3 4 5	1 2 3 4 5
STUDENT ORGANIZATIONS		
120. Demonstrate a personal commitment concerning students' participation in student vocational organizations.	1 2 3 4 5	1 2 3 4 5
121. Integrate and actively involve students into an ongoing student vocational organization.	1 2 3 4 5	1 2 3 4 5
122. Prepare students for leadership roles in student vocational organizations.	1 2 3 4 5	1 2 3 4 5
123. Provide students with opportunities for a wide range of social experiences through vocational student organizations.	1 2 3 4 5	1 2 3 4 5
124. Obtain approval from school administration for establishing a student vocational organization.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
STUDENT ORGANIZATIONS (24-41)		
125. Contact state leadership regarding the steps to be followed in organizing a student vocational organization.	1 2 3 4 5	1 2 3 4 5
126. Acquaint prospective members and their parents with the purposes, activities and values of the student vocational organization.	1 2 3 4 5	1 2 3 4 5
127. Organize a student committee to assess the interest of students in joining a vocational organization.	1 2 3 4 5	1 2 3 4 5
128. Conduct an organizational meeting for student vocational organizations.	1 2 3 4 5	1 2 3 4 5
129. Coordinate student vocational organization activities with instructional activities.	1 2 3 4 5	1 2 3 4 5
130. Maintain a file of publications available for the student vocational organization.	1 2 3 4 5	1 2 3 4 5
131. Maintain student vocational organizations as integral part of the instructional vocational education program.	1 2 3 4 5	1 2 3 4 5
132. Serve as an advisor or judge for district, state, regional or national student vocational organization contests.	1 2 3 4 5	1 2 3 4 5
133. Participate in state, district, regional and national activities of the student vocational organization.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH

SECTION II. Competencies Unique to Working with Handicapped Students

PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (42-65)

134. Obtain follow-up information on handicapped students leaving or graduating from school programs.	1 2 3 4 5	1 2 3 4 5
135. Assist in a long-range plan for integrating the handicapped student into the vocational education program.	1 2 3 4 5	1 2 3 4 5
136. Identify needs and interests of the handicapped student.	1 2 3 4 5	1 2 3 4 5
137. Revise selection criteria to ensure program accessibility for handicapped students.	1 2 3 4 5	1 2 3 4 5
138. Develop an integrated program for each handicapped student in cooperation with special education teachers and other school personnel.	1 2 3 4 5	1 2 3 4 5
139. Develop instructional activities by clustering and sequencing related tasks according to individual handicapped student's interests, abilities and needs.	1 2 3 4 5	1 2 3 4 5
140. Select, adapt, or develop instructional materials for use with handicapped students.	1 2 3 4 5	1 2 3 4 5
141. Develop instructional units revolving around job-specific concepts and skills and the needs and abilities of handicapped students.	1 2 3 4 5	1 2 3 4 5
142. Devise flexible time limits based upon individual rates of progress.	1 2 3 4 5	1 2 3 4 5
143. Identify the services needed to increase handicapped student's chances of being successful in regular programs.	1 2 3 4 5	1 2 3 4 5
144. Assist in the development of individualized programs (IEP) for handicapped students.	1 2 3 4 5	1 2 3 4 5
145. Evaluate a students' performance according to the objectives on the individualized education plan (IEP).	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (66-79)		
146. Determine appropriate techniques for evaluating the performance of students with specific handicaps.	1 2 3 4 5	1 2 3 4 5
147. Develop behavior observation skills concerning handicapped students.	1 2 3 4 5	1 2 3 4 5
148. Apply individual instructional prescription to all handicapped pupils in class.	1 2 3 4 5	1 2 3 4 5
149. Use the basic principles of learning theory and behavior modification related to vocational instruction for the handicapped.	1 2 3 4 5	1 2 3 4 5
150. Interact positively and naturally with the handicapped student.	1 2 3 4 5	1 2 3 4 5
151. Emphasize qualities of initiative, self-reliance, and independence with the handicapped learner.	1 2 3 4 5	1 2 3 4 5
152. Modify instructional materials and equipment for individual handicapped learners' needs.	1 2 3 4 5	1 2 3 4 5 [4] (80) (4-13)
153. Develop a procedure for fulfilling an individual instructional prescription in the classroom and laboratory situation.	1 2 3 4 5	1 2 3 4 5
154. Translate statements describing physical and sensory limitations into statements concerning instructional limitations and/or adaptions.	1 2 3 4 5	1 2 3 4 5
155. Sequence tasks to conform with learning styles, learning pace, and inferred learning potential of handicapped students.	1 2 3 4 5	1 2 3 4 5
156. Provide teaching strategies and delivery systems based upon individual learning styles and abilities of handicapped students.	1 2 3 4 5	1 2 3 4 5
157. Revise methods of performing tasks.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROGRAM PLANNING, DEVELOPMENT, AND EVALUATION (14-31)		
158. Develop appropriate attitudes of non-handicapped students toward handicapped students.	1 2 3 4 5	1 2 3 4 5
PROGRAM MANAGEMENT		
159. Secure related services for handicapped students necessary to provide the total quality aspects of the program.	1 2 3 4 5	1 2 3 4 5
160. Modify or adapt when necessary the tools, equipment, facilities, or conditions in the learning environment to meet the needs of the handicapped student.	1 2 3 4 5	1 2 3 4 5
SCHOOL/COMMUNITY RELATIONS		
161. Assist parents and other teachers in interpreting vocational programs and services for the handicapped student.	1 2 3 4 5	1 2 3 4 5
162. Identify and provide orientation for potential employers of handicapped students.	1 2 3 4 5	1 2 3 4 5
163. Cooperate with appropriate agencies and groups in identifying career opportunities for the handicapped student.	1 2 3 4 5	1 2 3 4 5
164. Influence attitudes of regular school personnel and non-handicapped students toward acceptance of handicapped students.	1 2 3 4 5	1 2 3 4 5
STUDENT GUIDANCE		
165. Assist the handicapped student in viewing his/her assets and limitations realistically.	1 2 3 4 5	1 2 3 4 5
166. Assist in identifying school vocational education purposes and goals for the handicapped student.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
STUDENT GUIDANCE		(32-53)
167. Counsel parents/guardians of handicapped students regarding their child's vocational education and career plans.	1 2 3 4 5	1 2 3 4 5
168. Conduct a purposeful home and community visit for each handicapped student.	1 2 3 4 5	1 2 3 4 5
169. Assess the ability of the handicapped to modify his/her behavior.	1 2 3 4 5	1 2 3 4 5
170. Assist in developing suitable job placement for handicapped students.	1 2 3 4 5	1 2 3 4 5
171. Assist each handicapped student to develop and maintain a positive self-concept.	1 2 3 4 5	1 2 3 4 5
172. Assist handicapped students in developing social, physical, and emotional security needed for obtaining and maintaining future employment.	1 2 3 4 5	1 2 3 4 5
PROFESSIONAL ROLE AND DEVELOPMENT		
173. Identify types of barriers (i.e., attitudinal, architectural, et cetera) that have inhibited training and employment of handicapped persons.	1 2 3 4 5	1 2 3 4 5
174. Make basic recommendations to ensure the accessibility and safety of a facility for handicapped persons.	1 2 3 4 5	1 2 3 4 5
175. Use and supervise service personnel in providing vocational training for handicapped persons.	1 2 3 4 5	1 2 3 4 5
176. Identify and participate in professional organizations concerned with handicapped persons.	1 2 3 4 5	1 2 3 4 5
177. Maintain ethical and legal standards appropriate for working with handicapped students.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH
PROFESSIONAL ROLE AND DEVELOPMENT		(54-61)
178. Analyze personal and professional abilities and limitations in providing instruction to handicapped persons.	1 2 3 4 5	1 2 3 4 5
179. Communicate effectively with other professionals to solve problems of the handicapped student.	1 2 3 4 5	1 2 3 4 5
STUDENT ORGANIZATIONS		
180. Integrate and actively involve handicapped students into an ongoing student vocational organization.	1 2 3 4 5	1 2 3 4 5
181. Provide handicapped students with opportunities for a wide range of social experiences through vocational student organizations.	1 2 3 4 5	1 2 3 4 5

COMPETENCY/KNOWLEDGE STATEMENT	1. PRESENT LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH	2. DESIRED LEVEL OF COMPETENCY DEVELOPMENT LOW HIGH

SECTION III. Competencies Unique to Coordinators
(To be completed by Teacher-Coordinators of Cooperative Training Programs) (62-79)

182. Establish criteria for selection of student-learners.	1 2 3 4 5	1 2 3 4 5
183. Provide prospective student-learners with resource materials on vocational opportunities to aid them in selecting a vocation.	1 2 3 4 5	1 2 3 4 5
184. Identify a prospective student-learner on basis of selection criteria and data.	1 2 3 4 5	1 2 3 4 5
185. Match a student-learner's unique characteristics with an appropriate training station.	1 2 3 4 5	1 2 3 4 5
186. Select student-learner's training stations.	1 2 3 4 5	1 2 3 4 5
187. Establish criteria to evaluate and approve training stations.	1 2 3 4 5	1 2 3 4 5
188. Assess training capability of the prospective training station.	1 2 3 4 5	1 2 3 4 5
189. Assess educational adequacy of a prospective training station's facilities and equipment.	1 2 3 4 5	1 2 3 4 5
190. Supervise student-learner's on-the-job experience.	1 2 3 4 5	1 2 [3] 4 5 (80) (4-15)
191. Develop a training plan for student-learner with employer.	1 2 3 4 5	1 2 3 4 5
192. Sponsor employer/student-learner appreciation event for the vocational program.	1 2 3 4 5	1 2 3 4 5
193. Obtain from advisory committee information on ways to improve related instruction and on-the-job training.	1 2 3 4 5	1 2 3 4 5
194. Uphold acceptable standards of student behavior at training stations.	1 2 3 4 5	1 2 3 4 5
195. Review course content with the training sponsor.	1 2 3 4 5	1 2 3 4 5
196. Complete a cooperative training agreement unique to meeting the needs of the individual.	1 2 3 4 5	1 2 [6] 4 5 (80)

Appendix C

Job Inventory Survey Form

Appendix C

Job Inventory Survey Form

JOB INVENTORY

Vocational-Technical Student's Competency List		
Check (✓) only those competencies which are included in the curriculum and which you are now teaching. Check (✓) right column for competencies which are not taught now but are desired in future revised curriculum.	Check ✓ if taught now	Check ✓ if to be included in revised curriculum
Computer Operator (07.0302)		
Change or align paper in printers		
Correct stoppages on printers		
Perform restart procedures on computer system		
Perform system initialization procedures		
Mount or dismount magnetic or paper tapes		
Address or call system via console action to respond to system requests		
Load programs or data from cards		
Load programs or data from tapes		
Power up or power down CPU		
Address or call system via console to request information		
Respond to or correct errors via console operation		
Review console output for job status		
Set or reset computer time clocks		
Initiate batched job processing		
Responds to messages or signals displayed by ADPE		
Performs recoveries of machines due to electrical or mechanical failures		
Isolates causes of machine stops or malfunctions		
Degausses and cleans tapes		
Establishes daily program run priorities		
Insures input data is complete prior to scheduling programs for computer runs		
Performs computer operator maintenance and administrative functions.		
Correct stoppages on magnetic tape drives		
Correct stoppages on card readers		

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COMPUTER OPERATOR - Additional Tasks 141

	Check if taught now	Check to be include

Business Data Entry Peripherial Equipment Operations (07.0304)

- Change or align paper in printers
- Correct stoppages on printers
- Notify supervisors or management of machine failure, downtime, or processing problem
- Correct stoppages on card readers
- Power up or power down peripheral equipment
- Replace print ribbons in data processing equipment
- Correct stoppages on magnetic tape drives
- Remove printed data output
- Correct stoppages on card punch machines
- Perform system initialization procedures
- Mount or dismount magnetic or paper tapes
- Load or unload punch cards in or from automatic data processing (ADP) equipment
- Load programs or data from cards
- Load programs or data from tapes
- Address or call system via console to request information
- Respond to or correct errors via console operation
- Perform operator maintenance on ADP equipment
- Punch cards
- Label magnetic media externally
- Notify programmers of processing problems
- Reproduce cards
- Interpret cards by machine
- Convert or record data from one media to another media, as card to tape or tape to disk
- Enter data or programs into computer via console
- Interpret indicating lights on peripheral equipment
- Clean or inspect magnetic media
- Correct stoppages on disk drives
- Burst, decollate, or assemble printed output
- Mount or dismount carriage control tapes (printer)

BUSINESS DATA ENTRY PERIPHERIAL EQUIPMENT OPERATIONS

Additional Tasks

	Check if taught now	Check to be included

Programmer, Detail (07.0305)

- Prepares block diagrams, flow charts, and computer coding
- Prepares, tests, and documents computer routines and programs
- Determines input/output devices
- Prepares input and output formats and instructions
- Prepares system or program test data
- Prepare adequate computer edits of input data
- Arranges test data prior to initial computer processing
- Prepares, writes, or updates program documentation
- Analyzes output products for compliance with specifications, standards, and interface with existing systems
- Debugs computer programs
- Utilizes state-of-the-art techniques, such as Top Down Design and Structured Programming
- Confers with systems analyst and subject matter personnel in preparation of program routines.
- Develops and maintain generalized utility routines for application in appropriate overall programs
- Reviews existing routines for applicability of new techniques
- Assists in developing machine logic charts for machine routines
- Schedules and controls computer input/output
- Coordinates with OPM on new or revised reporting formats
- Analyzes and updates existing programs
- Maintain familiarity with and utilizes, whenever practicable, internal and remote inquiry techniques to input, update, or retrieve data
- Punch and reproduce cards
- Enter data or programs into computer via console
- Load programs or data from disks, cards, or tapes
- Initiate batched job processing, and convert or record data from one media to another
- Determine cause of faulty output products
- Assemble, rearrange, or edit input/output data

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PROGRAMMER, DETAIL - Additional Tasks

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	Check if taught now	Check to be included

File magnetic media

Inventory magnetic media

Clean or inspect magnetic media

Place load-point or end-of-tape markers on magnetic tape

Place scratch tapes in computer room

Update scratch tapes or disk pack inventory lists

Maintain off-site or remote storage backup files

Initialize new magnetic media

Degauss magnetic media

Splice magnetic tapes or leaders

Compare tape identifications and tape file-controls for agreement

Punch cards

Identify or order tapes needed from off-site storage

Label magnetic media externally

Make entries in disk pack or tape control logs

Prepare tape usage reports

Review tapes for file classification

Review accuracy of tape or disk pack library lists with subsystem processing instructions

Check in or check out magnetic media from library

Issue or receive magnetic media from library

Prepare job or run sheets

Batch run requests

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BUSINESS DATA PROCESSING AND RELATED - Additional Tasks	Check if 147 taught now	Check to be included

Appendix D

Second List of Occupational Competencies

BUSINESS SYSTEMS ANALYSIS

Instructional Program Code and Title (and description)	Occupational Code and Title
07.0306 Business Systems Analysis. (An instructional program that prepares individuals to analyze specific problems for data refinement and summarization; study existing data handling systems to evaluate effectiveness; and develop new systems to meet current and projected data processing needs. Includes instruction in the preparation of technical reports and instructional manuals related to establishment of complete operational data systems.)	012.167-066 Systems Analyst, Electronic Data Processing 109.067-010 Information Scientist

Check ( ) only those competencies (tasks) which should be developed by students who are preparing to obtain employment upon completion of a Business Systems Analysis training program.

Competency (task) Statement	Should be developed by students in the Instructional Program
1. Review program specifications.	
2. Review program requirements.	
3. Determine systems input or output requirements.	
4. Prepare or revise program specifications.	
5. Prepare systems specifications.	
6. Prepare system narratives.	
7. Conduct design analysis or project team meetings.	
8. Prepare documentation for individual programs.	
9. Design data elements or codes.	
10. Prepare system test plans.	
11. Prepare system test data.	
12. Conduct final system reviews for user approval.	

Competency (task) Statement	Should be developed by students in the Instructional Program
13. Define systems interface or integration requirements.	
14. Estimate programming or system requirements.	
15. Analyze data base requirements.	
16. Design error handling routines.	
17. Debug computer programs.	
18. Compile or assemble programs.	
19. Prepare program test specifications or instructions.	
20. Prepare or revise computer operator instructions.	
21. Test computer programs.	
22. Analyze or review system test results.	
23. Desk check programs.	
24. Code computer programs in higher level languages.	
25. Determine causes of program halts or abends.	
26. Design input or output formats, such as card, printed, or microform report formats.	
27. Develop models or dummy data to simulate functional requirements.	

BUSINESS DATA PROGRAMMING

Instructional Program Code and Title (and description)	Occupational Code and Title	
07.0305 Business Data Programming (An instructional program that prepares individuals to convert problems into detailed flow charts; code into computer language; test, monitor, debug, document, and maintain computer programs; and design programs for specific uses and machines.)	020.162-014	Programmer, Business
	020.167-018	Programmer, Chief, Business
	020.187-010	Programmer, Information System
	020.187-014	Programmer, Process Control
	169.167-030	Manager, Electronic Data Processing
	219.367-026	Programmer, Detail

Check ( ) only those competencies (tasks) which should be developed by students who are preparing to obtain employment upon completion of a Business Data Programming training program.

Competency (task) Statement	Should be developed by students in the Instructional Program
1. Prepares block diagrams, flow charts, and computer coding.	
2. Prepares, tests, and documents computer routines and programs.	
3. Determines input/output devices.	
4. Prepares input and output formats and instructions.	
5. Prepares system or program test data.	
6. Prepare adequate computer edits of input data.	
7. Arranges test data prior to initial computer processing.	
8. Prepares, writes, or updates program documentation.	
9. Analyzes output products for compliance with specifications, standards, and interface with existing systems.	
10. Debugs computer programs.	
11. Utilizes state-of-the-art techniques, such as Top Down Design and Structured Programming.	

Competency (task) Statement	Should be developed by students in the Instructional Program
12. Confers with systems analyst and subject matter personnel in preparation of program routines.	
13. Develops and maintains generalized utility routines for application in appropriate overall programs.	
14. Reviews existing routines for applicability of new techniques.	
15. Assists in developing machine logic charts for machine routines.	
16. Schedules and controls computer input/output.	
17. Coordinates with OPR on new or revised reporting formats.	
18. Analyzes and updates existing programs.	
19. Maintain familiarity with and utilizes, whenever practicable, internal and remote inquiry techniques to input, update, or retrieve data.	
20. Punch and reproduce cards.	
21. Enter data or programs into computer via console.	
22. Load programs or data from disks, cards, or tapes.	
23. Initiate batched job processing, and convert or record data from one media to another.	
24. Determine cause of faulty output products.	
25. Assemble, rearrange, or edit input/output data.	
26. Code computer in higher level languages.	
27. Code job control languages.	
28. Develop models or dummy data to simulate functional requirements.	
29. Review console output for job status.	
30. Prepare or revise program specifications.	

Competency (task) Statements	Should be developed by students in the Instructional Program
31. Estimate programming or systems requirements.	
32. Interrogate memory location via console action.	
33. Interpret indicating or register lights on CPU.	
34. Analyze console printouts to identify computer stoppages.	
35. Desk check programs.	
36. Design error handling routines.	
37. Perform system initialization procedures.	
38. Perform restart procedures on computer system.	
39. Address or call system via console action to respond to system requests.	
40. Use ANSI standard flowchart symbols to follow, create flowcharts and to interpret a flowchart.	
41. Prepare job control instructions and operating instructions to execute programs.	
42. Maintain schedule to ensure completion of programming projects.	
43. Prepare operator instructions and related documentation.	
44. Calculate problems using hexidecimal number system.	
45. Calculate problems using binary number system.	
46. Demonstrate manipulation functions for CRT.	
47. Enter source statements on CRT.	
48. Create file for CRT.	
49. Write procedures for CRT.	
50. Design screen format for CRT.	

Competency (task) Statements	Should be developed by students in the Instructional programs
(Advanced BASIC programming)	
51. Writes and runs program in BASIC using compiles arithmetic, compares, and program switches.	
52. Programs a problem in BASIC using functions and subroutines.	
53. Uses BASIC language to control print-out for titles and column headings.	
54. Manipulates data in subscripted arrays within the BASIC programming language.	
55. Uses matrices in the BASIC programming language.	
(COBOL programming)	
56. Identifies correct syntax and rules for forming names in the COBOL language.	
57. Codes a COBOL program which will successfully compile.	
58. Writes a COBOL program which produces output according to specifications.	
59. Uses arithmetic operators in a COBOL program.	
60. Compares data fields and processes totals in COBOL.	
61. Writes programs which include printing and editing of input data.	
62. Writes COBOL programs with multiple control breaks and sub-totals.	
63. Uses tables and sorting in a COBOL program.	
64. Uses magnetic tape or disk for sequential input and output with COBOL programs.	
65. Creates and accesses an indexed file using COBOL.	

Competency (task) Statements	Should be developed by students in the Instructional programs
(FORTRAN programming)	
66. Identifies FORTRAN character set, variables, and constants.	
67. Codes, keypunches, and executes a simple program in FORTRAN.	
68. Codes and runs a simple program using integer arithmetic.	
69. Uses expotential output format.	
70. Uses a simple loop to solve several problems.	
71. Uses the FORTRAN format statements, control statements and arithmetic operations.	
72. Uses a pre-defined function.	
73. Edits input data to avoid invalid results.	
74. Translates a complex algebraic formula to FORTRAN language.	
75. Debugs a FORTRAN program containing coding errors.	
76. Detects and corrects multiple errors in a prepared program.	
77. Uses FORTRAN formats I, E, and F for both input and output.	
78. Uses formats to provide readable output.	
79. Uses the F format and iteration for a solution.	
80. Provides for ease of program maintenance by using documentation techniques.	
81. Solves a complex formula and writes output in tabular form.	
82. Uses logical and type statements.	
83. Solves a complex algebraic statement and writes output in readable form.	

Competency (task) Statements	Should be developed by students in the Instructional Program
84. Uses complex compare statements with logicals.	
85. Prepares and uses test data in program debugging.	
86. Uses complex compare statements and iteration to solve a forecast problem.	
87. Uses multiple compares and complex logic.	
88. Uses looping controls and intrinsic functions.	
89. Sorts using counters.	
90. Uses formatted tape, disk I/O and sub-programs.	
91. Builds and uses a matrix manipulation program.	
92. Creates and updates a master file.	
93. Uses variable tape and disk files to perform file maintenance.	
94. Uses a master file to print a formatted listing.	
95. Uses computer dependent FORTRAN statements.	
96. Uses compiler option cards.	
97. Builds two programs that must run simultaneously.	
(Report Program Generator II - RPG II)	
98. Uses operation control language to compile and execute RPG programs.	
99. Uses basic concepts and terms related to processing with RPG II.	
100. Produces printed output from card input using RPG II.	
101. Uses RPG to perform calculations and print totals.	
102. Edits output by use of edit codes and edit words.	

Competency (task) Statements	Should be developed by students in the Instructional Program
103. Uses the compare operation of RPG II to cause conditional processing.	
104. Controls calculations and output using level indicators for control breaks.	
105. Prints selected overflow lines using the fetch overflow feature.	
106. Processes data with multiple record types within a single input file.	
107. Uses the look-ahead feature of RPG II.	
108. Causes repetitive printing of exception output during calculations.	
109. Writes RPG II programs with tables and table lookup.	
110. Uses arrays for processing data with RPG.	
111. Uses the system/3 file statement for creating and accessing disk files.	
112. Builds sequential disk files with RPG II to read and print the contents of the file.	
113. Processes data from two files which require matching of records.	
114. Controls selection of files using the RPG II compiler.	
115. Uses the debug feature of the system/3 RPG II compiler.	
116. Builds and retrieves an index sequential file using RPG II.	
117. Randomly processes a disk file using the chain operation of RPG II.	
118. Uses subroutines in an RPG II program.	

BUSINESS DATA PERIPHERAL EQUIPMENT OPERATION

Instructional Program Code and Title (and description)	Occupational Code and Title	
07.0304 Business Data Peripheral Equipment Operation. (An instructional program that prepares individuals to operate on-line or off-line peripheral equipment such as sorters, collators, high-speed printers, bursting machines, tape-to-card and card-to-tape converters, and scanners.)	208.685-010	Collator Operator
	208.685-030	Sorting-Machine Operator
	213.382-010	Computer-Peripheral-Equipment Operator
	213.682-010	Tabulating-Machine Operator
	213.685-010	Auxiliary-Equipment Operator, Data Processing
	217.685-010	Bursting-Machine Tender

Check ( ) only those competencies (tasks) which should be developed by students who are preparing to obtain employment upon completion of a Business Data Peripheral Equipment Operation training Program.

Competency (task) Statement	Should be developed by students in the Instructional Program
1. Change or align paper in printers.	
2. Correct stoppages on printers.	
3. Notify supervisors or management of machine failure, downtime, or processing problem.	
4. Correct stoppages on card readers.	
5. Power up or power down peripheral equipment.	
6. Replace print ribbons in data processing equipment.	
7. Correct stoppages on magnetic tape drives.	
8. Remove printed data output.	
9. Correct stoppages on card punch machines.	
10. Perform system initialization procedures.	
11. Mount or dismount magnetic or paper tapes.	
12. Load or unload punch cards in or from automatic data processing (ADP) equipment.	
13. Load programs or data from cards.	
14. Load programs or data from tapes.	

Competency (task) Statement	Should be developed by students in the Instructional Program
15. Address or call system via console to request information.	
16. Respond to or correct errors via console operation.	
17. Perform operator maintenance on ADP equipment.	
18. Punch cards.	
19. Label magnetic media externally.	
20. Notify programmers of processing problems.	
21. Reproduce cards.	
22. Interpret cards by machine.	
23. Convert or record data from one media to another media, as card to tape or tape to disk.	
24. Enter data or programs into computer via console.	
25. Interpret indicating lights on peripheral equipment.	
26. Clean or inspect magnetic media.	
27. Correct stoppages on disk drives.	
28. Burst, decollate, or assemble printed output.	
29. Mount or dismount carriage control tapes (printer).	
30. Perform start/stop and restart procedures on a card punch (with jam clearing).	
31. Prepares maintenance schedule for peripheral devices in the computer center.	
32. Stores and handles reels of magnetic tape.	
33. Perform start/stop procedures on card reader.	
34. Perform restart steps in card reader.	
35. Prepares maintenance schedule for peripheral devices in the computer center.	

Competency (task) Statements	Should be developed by students in the Instructional Program
36. Performs start/stop and restart procedures on a disk drive.	
37. Loads and unloads a disk drive.	

BUSINESS DATA ENTRY EQUIPMENT OPERATION

Instructional Program Code and Title (and description)	Occupational Code and Title
07.0303 Business Data Entry Equipment Operation. (An instructional program that prepares individuals to operate keypunch or special-purpose key entry devices to convert source documents to machine input media for electronic data processing, verify and correct data, and monitor equipment during operation.)	203.362-014 In-File Operator 203.362-018 Terminal-System Operator 203.382-018 Magnetic-Tape-Composer Operator 203.582-018 Cryptographic-Machine Operator 203.582-022 Data Typist 203.582-026 Data-Coder Operator 203.582-030 Keypunch Operator 203.582-054 Terminal Operator 203.582-070 Verifier Operator 206.387-030 Tape Librarian 208.382-010 Terminal-Makeup Operator 209.137-022 Supervisor, Coding Clerks 209.387-010 Coding Clerk 209.387-022 Data-Examination Clerk 219.137-014 Supervisor, Data-Control Clerk 221.367-046 Mill Recorder, Computerized Mill 221.382-014 Control Clerk, Data Processing 1

Check ( ) only those competencies (tasks) which should be developed by students who are preparing to obtain employment upon completion of a Business Data Entry Equipment Operation training program.

Competency (task) Statement	Should be developed by students in the Instructional Program
1. Converts routine items of information into codes for processing	
2. Manually records alphabetic or numeric data, and calculates batch totals.	
3. Receives and reviews input and output to verify for accuracy and completeness of source documents.	
4. Maintains records and coding systems necessary to process and review document input and output.	
5. Investigates and corrects problems causing incorrect input or output.	

Competency (task) Statements	Should be developed by students in the Instructional Program
6. Classifies and catalogs reels created by system.	
7. Prepares file labels.	
8. Maintains records of file usage.	
9. Adheres to file security procedures.	
10. Oversees disbursement and/or storage of data processing materials and supplies.	
11. Requisitions of data processing forms and supplies.	
12. Processes materials and supplies received.	
13. Uses file building techniques and procedures.	
14. Classifies files by their physical properties.	
15. Uses file maintenance techniques.	
16. Operates a reproducer.	
17. Operates a sorter.	
18. Operates a decollator.	
19. Operates a burster.	

BUSINESS COMPUTER AND CONSOLE OPERATION

Instructional Program Code and Title (and description)	Occupational Code and Title
07.0302 Business Computer and Console Operation. (An instructional program that prepares individuals to operate electronic data processing computers. Includes instruction in the review of program instructions, determination of procedures for a specific run, readying equipment for operation, and manipulation and monitoring of controls during operation. Instruction also is given in troubleshooting and all types of on- and off-line operations.)	213.132-010 Supervisor, Computer Operations. 213.132-014 Supervisor, Machine-Records Unit 213.362-010 Computer Operator 221 687-010 Control Clerk, Data Processing 2

Check ( ) only those competencies (tasks) which should be developed by students who are preparing to obtain employment upon completion of a Business Computer and Console Operation training Program.

	Competency (task) Statement	Should be developed by students in the Instructional Program
1.	Change or align paper in printers.	
2.	Correct stoppages on printers.	
3.	Perform restart procedures on computer system.	
4.	Perform system initialization procedures.	
5.	Mount or dismount magnetic or paper tapes.	
6.	Address or call system via console action to respond to system requests.	
7.	Load programs or data from cards.	
8.	Load programs or data from tapes.	
9.	Power up or power down CPU.	
10.	Address or call system via console to request information.	
11.	Respond to or correct errors via console operation.	
12.	Review console output for job status.	
13.	Set or reset computer time clocks.	

Competency (task) Statement	Should be developed by students in the Instructional Program
14. Initiate batched job processing.	
15. Responds to messages or signals displayed by ADPE.	
16. Performs recoveries of machines due to electrical or mechanical failures.	
17. Isolates causes of machine stops or malfunctions.	
18. Degausses and cleans tapes.	
19. Establishes daily program run priorities.	
20. Insures input data is complete prior to scheduling programs for computer runs.	
21. Performs computer operator maintenance and administrative functions.	
22. Correct stoppages on magnetic tape drives.	
23. Correct stoppages on card readers.	
24. Job control language.	
25. Responsibilities for what supplies and equipment needed for job.	
26. Keep logs of runs and job status.	
27. Keep logs of equipment problems and recovery procedures.	
28. Mount/dismount magnetic disk.	
29. Keep schedualized logs.	
30. Return materials to users (other students).	
31. Use operation control language.	
32. Use system utilities to produce desired results.	
33. Initialization: Load initial program.	
34. Perform remote processing operations.	
35. Produce output on required medium.	
36. Demonstrate proper care of storage medium.	
37. Perform backup operations.	

Competency (task) Statements	Should be developed by students in the Instructional Program
38. Operational error recovery: management error flow.	
39. Operational error recovery: cylical error correction.	
40. Burst, decollate or assemble printed output.	
41. Repalce print ribbons in data processing equipment.	
42. Power up or power down for peripheral equipment.	
43. Label magnetic media externally.	
44. Schedule computer room operations.	
45. Demonstrates proper usage and knowledge of data processing terminology.	
46. Demonstrates knowledge of data processing history.	

Appendix E

Questionnaire used to Finalize

Occupational Competency List

Questionnaire II

Competencies of
Secondary Data Processing Students

Enclosed is the final round of the Delphi Identification of competencies required by students who complete vocational secondary data processing programs. Also enclosed is Questionnaire I so that you may review the mean responses to each statement.

Your task for this round will be to reconsider your answers concerning the competencies required of secondary data processing students. You may register your response by circling a number on a scale of 1 (disagree) to 7 (agree) in the column of numbers to the right of the statements. If you strongly agree that the competency is needed, you would indicate as follows:

Disagree Agree
1 2 3 4 5 6 (7)

On the other hand, if you disagree that the competency is necessary, your disagreement should be indicated by circling as follows:

Disagree Agree
(1) 2 3 4 5 6 7

Circling number 4 would indicate that you feel the competency is about as important as unimportant; circling any other numbers (2, 3, 5, 6) would indicate respectively increasing levels of disagreement or agreement with the competency, depending upon the direction of your feelings.

Please respond to every statement even if you decide your answer should remain the same as last time. Be certain to make only one response per statement.

Please return Questionnaire II in the enclosed, addressed envelop at your earliest convenience. I certainly appreciate your participation and await your answers to Questionnaire II. Thank you for your interest and cooperation.

Delphi Identification of student competencies which should be developed by students completing this program.

BUSINESS COMPUTER AND CONSOLE OPERATION

Instructional Program Code and Title (and description)	Occupational Code and Title
07.0302 Business Computer and Console Operation. (An instructional program that prepares individuals to operate electronic data processing computers. Includes instruction in the review of program instructions, determination of procedures for a specific run, readying equipment for operation, and manipulation and monitoring of controls during operation. Instruction also is given in troubleshooting and all types of on- and off-line operations.)	213.132-010 Supervisor, Computer Operations 213.362-010 Computer Operator

To what extent do you agree or disagree that the following competencies should be developed by students completing this program.

	Competency (task) Statement	Disagree						Agree
1.	Perform restart procedures on computer software system.	1	2	3	4	5	6	7
2.	Perform restart procedures on computer hardware system.	1	2	3	4	5	6	7
3.	Perform software system initialization procedures.	1	2	3	4	5	6	7
4.	Perform hardware initialization procedures.	1	2	3	4	5	6	7
5.	Interact with hardware system via console with software.	1	2	3	4	5	6	7
6.	Power up CPU.	1	2	3	4	5	6	7
7.	Power down CPU.	1	2	3	4	5	6	7
8.	Respond to or correct errors via console operation.	1	2	3	4	5	6	7
9.	Review console output for job status.	1	2	3	4	5	6	7
10.	Initiate batched job processing.	1	2	3	4	5	6	7

	Competency (task) Statement	Disagree						Agree
11.	Determine causes of hardware stops or malfunctions.	1	2	3	4	5	6	7
12.	Perform minor maintenance on hardware.	1	2	3	4	5	6	7
13.	Follow instructions necessary to run job.	1	2	3	4	5	6	7
14.	Keep logs of runs and job status.	1	2	3	4	5	6	7
15.	Keep logs of hardware problems and recovery procedures.	1	2	3	4	5	6	7
16.	Mount/dismount magentic disk.	1	2	3	4	5	6	7
17.	Use operational control language.	1	2	3	4	5	6	7
18.	Use system utilities to produce desired results.	1	2	3	4	5	6	7
19.	Perform remote processing operations.	1	2	3	4	5	6	7
20.	Prepare for output on required medium.	1	2	3	4	5	6	7
21.	Insure proper care of storage medium.	1	2	3	4	5	6	7
22.	Perform backup operations.	1	2	3	4	5	6	7
23.	Schedule computer room operations.	1	2	3	4	5	6	7
24.	Interpret and apply instructions from written procedures.	1	2	3	4	5	6	7

Delphi Identification of student competencies which should be developed by students completing this program.

BUSINESS DATA ENTRY EQUIPMENT OPERATION

Instructional Program Code and Title (and description)	Occupational Code and Title
07.0303 Business Data Entry Equipment Operation. (An instructional program that prepares individuals to operate keypunch or special-purpose key entry devices to convert source documents to machine input media for electronic data processing, verify and correct data, and monitor equipment during operation.)	203.362-014 In-File Operator 203.362-018 Terminal-System Operator 203.382-018 Magnetic-Tape-Composer Operator 203.582-022 Data Typist 203.582-026 Data-Coder Operator 203.582-030 Keypunch Operator 203.582-054 Terminal Operator 203.582-070 Verifier Operator 206.387-030 Tape Librarian 208.382-010 Terminal-Makeup Operator 209.137-022 Supervisor, Coding Clerks 209.387-010 Coding Clerk 209.387-002 Data-Examination Clerk 219.137-014 Supervisor, Data-Control Clerk 221.382-014 Control Clerk, Data Processing I

To what extent do you agree or disagree that the following competencies should be developed by students completing this program.

Competency (task) Statement DATA CONTROL CLERK	Disagree Agree
1. Convert routine items of information into codes for processing.	1 2 3 4 5 6 7
2. Manually record alphabetic or numeric data, and calculates batch totals.	1 2 3 4 5 6 7
3. Receive and review input and output to verify for accuracy and completeness of source documents.	1 2 3 4 5 6 7
4. Maintain records and coding systems necessary to process and review document input and output.	1 2 3 4 5 6 7
5. Investigate and correct problems causing incorrect input or output.	1 2 3 4 5 6 7

	Competency (task) Statements	Disagree						Agree
6.	Operate data entry hardware.	1	2	3	4	5	6	7
7.	Perform operator maintenance on data entry hardware.	1	2	3	4	5	6	7
8.	Perform transcription of source data into magnetic coded media.	1	2	3	4	5	6	7
	LIBRARIAN							
1.	Classify and [illegible]g reels created by system.	1	2	3	4	5	6	7
2.	Prepare file labels.	1	2	3	4	5	6	7
3.	Maintain records of equipment and supply usage.	1	2	3	4	5	6	7
4.	Adhere to file security procedures.	1	2	3	4	5	6	7
5.	Oversee disbursement and/or storage of data processing materials and supplies.	1	2	3	4	5	6	7
6.	Requisition of data processing forms and supplies.	1	2	3	4	5	6	7
7.	Process materials and supplies recieved.	1	2	3	4	5	6	7
8.	Use file building techniques and procedures.	1	2	3	4	5	6	7
9.	Classify files by their physical properties.	1	2	3	4	5	6	7
10.	Use file maintenance techniques.	1	2	3	4	5	6	7

Delphi Identification of student competencies which should be developed by students completing this program.

BUSINESS DATA PERIPHERAL EQUIPMENT OPERATION

Instructional Program Code and Title (and description)	Occupational Code and Title	
07.0304 Business Data Peripheral Equipment Operation.	213.382-010	Computer-Peripheral-Equipment Operator
(An instructional program that prepares individuals to operate on-line or off-line peripheral equipment such as sorters, collators, high-speed printers, bursting machines, tape-to-card and card-to-tape converters, and scanners.)	213.685-010	Auxiliary-Equipment Operator, Data Processing
	217.685-010	Bursting-Machine Tender

To what extent do you agree or disagree that the following competencies should be developed by students completing this program.

	Competency (task) Statement	Disagree						Agree
1.	Change, align or remove paper in printers.	1	2	3	4	5	6	7
2.	Correct stoppages on printers.	1	2	3	4	5	6	7
3.	Notify supervisors or management of machine failure, downtime, or processing problems.	1	2	3	4	5	6	7
4.	Correct stoppages on card readers.	1	2	3	4	5	6	7
5.	Power up or power down peripheral hardware.	1	2	3	4	5	6	7
6.	Maintain print quality.	1	2	3	4	5	6	7
7.	Correct stoppages on magnetic tape drives.	1	2	3	4	5	6	7
8.	Correct stoppages on card punch machines.	1	2	3	4	5	6	7
9.	Mount or dismount magnetic or paper tapes.	1	2	3	4	5	6	7
10.	Load or unload punch cards in or from automatic data processing hardware.	1	2	3	4	5	6	7
11.	Load programs or data from media (i.e. cards, disk, tapes).	1	2	3	4	5	6	7
12.	Respond to or correct errors via peripheral console.	1	2	3	4	5	6	7
13.	Perform operator maintenance on peripheral hardware.	1	2	3	4	5	6	7
14.	Punch cards.	1	2	3	4	5	6	7

Appendix F

Data Processing Competency Inventory

COMPETENCY INVENTORY FOR BUSINESS DATA PROCESSING OCCUPATIONS

BACKGROUND DATA:
(please print)

YOUR NAME: _____ (optional)

NAME OF FIRM WHERE YOU ARE EMPLOYED: _____

CITY IN WHICH FIRM IS LOCATED: _____

WHAT IS YOUR PRESENT JOB TITLE (POSITION)? _____

WHAT OTHER NAMES ARE USED FOR THIS POSITION? _____ _____

_____ _____ _____ _____

SEX: M☐ F☐ NUMBER OF YEARS OF EXPERIENCE IN DATA PROCESSING: _____

IS YOUR PRESENT POSITION CONSIDERED A BUSINESS/OFFICE OCCUPATION? YES☐ NO☐

TYPE OF BUSINESS/INDUSTRY OF THE FIRM WHERE ARE EMPLOYED:

- AGRICULTURE, FORESTRY, FISHERY ☐
- MINING (METAL, COAL, CRUDE PETEROLEUM, NATURAL GAS) ☐
- MANUFUCTURING ☐
- TRANSPORTATION ☐
- COMMUNICATIONS, UTILITIES, SANITATION SERVICES ☐
- WHOLESALE OR RETAIL TRADE ☐
- FINANCE, INSURANCE, REAL ESTATE ☐
- BUSINESS SERVICES (ADVERTISING, MARKETING, COMMERCIAL R & D) ☐
- HEALTH SERVICES ☐
- LEGAL SERVICES ☐
- GOVERNEMNT AGENCY ☐
- OTHER (SPECIFY) ☐

_____

HOW MANY CLOCK HOURS OF TRAINING DO YOU FEEL ARE NECESSARY FOR AN INDIVIDUAL TO OBTAIN A JOB IN THE POSITION (JOB) IN WHICH YOU ARE NOW EMPLOYED?

_____

LEVEL OF EDUCATIONAL ATTAINMENT:

- DOCTORATE ☐
- MASTERS ☐
- BACHELORS ☐
- ASSOCIATES ☐
- HIGH SCHOOL DIPLOMA ☐
- GED ☐
- OTHER (SPECIFY) ☐

_____

WHERE DID YOU OBTAIN TRAINING FOR YOUR PRESENT POSITION?

- PRIVATE VOC/TECH SCHOOL ☐
- HIGH SCHOOL ☐
- COMMUNITY COLLEGE ☐
- 4 YEAR COLLEGE ☐
- COMPANY TRAINING PROGRAM ☐
- MILITARY ☐
- OTHER (SPECIFY) ☐

_____

DATA PROCESSING COMPETENCIES

INSTRUCTIONS FOR COMPLETING COMPETENCY INVENTORY

Carefully read each of the competency statements and place a check mark (✔) in the column labeled CHECK for each competency which you perform on your present job.

After checking all competencies which you perform, then rate only the competencies you have checked by placing a number 1, 2, 3, 4, 5, 6 or 7 in the column labeled TIME SPENT which most closely estimates the amount of time you spend in performing the competency.

Time spent means the total time you spend on each competency you are rating compared with the time you spend on each of the other tasks you do.

At the bottom of the last page write in and rate any competencies you do which are not listed.

COMPETENCY INVENTORY		PAGE 1 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
1. Perform restart procedures on computer software system.		
2. Perform restart procedures on computer hardware system.		
3. Perform software system initialization procedures.		
4. Perform hardware initialization procedures.		
5. Interact with hardware system via console with software		
6. Power up CPU		
7. Power down CPU.		
8. Respond to or correct errors via console operation.		
9. Review console output for job status.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 2 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
10. Initiate batched job processing.		
11. Determine causes of hardware stops or malfunctions.		
12. Perform minor maintenance on hardware.		
13. Follow instructions necessary to run job.		
14. Keep logs of runs and job status.		
15. Keep logs of hardware problems and recovery procedures.		
16. Mount/dismount magentic disk.		
17. Use operational control language.		
18. Use system utilities to produce desired results.		
19. Perform remote processing operations.		
20. Prepare for output on required medium.		
21. Ensure proper care of storage medium		
22. Perform backup operations.		
23. Schedule computer room operations.		
24. Interpret and apply instructions from written procedures.		
25. Convert routine items of information into codes for processing.		
26. Manually record alphabetic or numeric data, and calculates batch totals.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 3 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
27. Receive and review input and output to verify for accuracy and completeness of source documents.		
28. Maintain records and coding systems necessary to process and review document input and output.		
29. Investigate and correct problems causing incorrect input or output.		
30. Operate data entry hardware.		
31. Perform operator maintenance on data entry hardware.		
32. Perform transcription of source data into magnetic coded media.		
33. Classify and catalog reels created by system.		
34. Prepare file labels.		
35. Maintain records of equipment and supply usage		
36. Adhere to file security procedures.		
37. Oversee disbursement and/or storage of data processing materials and supplies.		
38. Requisition of data processing forms and supplies.		
39. Process materials and supplies recieved.		
40. Use file building techniques and procedures.		
41. Classify files by their physical properties.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 4 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
42. Use file maintenance techniques.		
43. Change, align or remove paper in printers.		
44. Correct stoppages on printers.		
45. Notify supervisors or management of machine failure, downtime, or processing problems.		
46. Correct stoppages on card readers.		
47. Power up or power down peripheral hardware.		
48. Maintain print quality.		
49. Correct stoppages on magnetic or paper tape.		
50. Correct stoppages on card punch machines.		
51. Mount or dismount magnetic or paper tapes.		
52. Load or unload punch cards in or from automatic data processing hardware.		
53. Load programs or data from media (i.e. cards, disk, tape).		
54. Respond to or correct errors via peripheral console.		
55. Perform operator maintenance on peripheral hardware.		
56. Punch cards.		
57. Label magnetic media externally.		
58. Notify supervisor of computer operations.		
59. Reproduce cards.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 5 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
60. Convert or record data from one media to another media, as card to tape or tape to disk.		
61. Interpret indicator lights on peripheral equipment.		
62. Clean or inspect magnetic media.		
63. Correct stoppages on disk drives.		
64. Burst, decollate, and assemble printed output.		
65. Mount or dismount carriage control tapes (printer).		
66. Perform start/stop and restart procedures on card punch (with jam clearing).		
67. Store and handle reels of magnetic tape.		
68. Perform start/stop and restart procedures on card reader.		
69. Perform start/stop and restart procedures on disk drive.		
70. Load and unload a disk drive.		
71. Determine causes of hardware stops or malfunctions.		
72. Perform minor maintenance of hardware.		
73. Follow instructions necessary to run job.		
74. Keep logs of hardware problems and recovery procedures.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 6 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
75. Prepare for output on required medium.		
76. Ensure proper care of storage medium.		
77. Interpret and apply instructions from written procedures.		
78. Design and code computer programs.		
79. Prepare computer routines and programs.		
80. Test computer routines and programs using appropriate test data.		
81. Document computer routines and programs.		
82. Prepare system or program test data.		
83. Prepare adequate computer edits of input data.		
84. Update program documentation.		
85. Analyze output products for compliance with specifications and standards.		
86. Determine the cause of invalid output and make necessary corrections (debug).		
87. Utilize state-of-the-art techniques, such as Top Down Design and Structured Programming.		
88. Confer with systems analyst and subject matter personnel in preparation of program routines.		
89. Develop and maintain generalized utility routines for application in appropriate overall programs.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 7 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
90. Review existing routines for applicability of new techniques.		
91. Analyze and update existing programs.		
92. Enter data or programs into computer via a terminal.		
93. Initiate batched job processing, and convert or record data from one media to another.		
94. Code job control languages.		
95. Prepare or revise program specifications.		
96. Estimate programming effort based on specifications.		
97. Desk check programs.		
98. Design error handling routines.		
99. Develop restart procedures in computer programs.		
100. Maintain schedule to ensure completion of programming projects.		
101. Prepare or assist in development of operator instructions and related documentation.		
102. Write procedures for use of CRT.		
103. Design screen format for CRT.		
104. Program in BASIC.		
105. Program in COBOL.		
106. Program in PASCAL.		

DATA PROCESSING COMPETENCIES

COMPETENCY INVENTORY		PAGE 8 OF 8 PAGES
Listed below are business data processing competencies. Check all competencies which you perform and then rate each competency you have checked.	CHECK ✔ if done	TIME SPENT 1. very much below average 2. below average 3. slightly below average 4. about average 5. slightly above average 6. above average 7. very much above average
107. Program in FORTRAN.		
108. Program in RPG.		

Use the space below to list all business data processing competencies you perform which are not listed in the attached survey. Then check and rate each competency you listed.		

Appendix C
Questionnaire Used for Evaluation

EVALUATION OF THE PROJECT

Update of Secondary Vocational Office Education
Data Processing Curriculum

Evaluation by TEA Project Officer and Project Staff.

Please check (✓) a "yes" or "no" for each of the evaluative criterion listed below.

Criterion	Yes	No
1. Management Plan and Tasks 1-5		
a) Was the time frame for completion of project tasks and activities appropriate?	☐	☐
b) Were the project milestones for tasks, activities and deliverables appropriate in relation to the time frame and products to be produced?	☐	☐
c) Were the person days allocated for each task sufficient?	☐	☐
d) Were appropriate non-personnel resources identified?	☐	☐
e) Was there sufficient description of each product to be produced?	☐	☐
f) Were reporting methods and procedures clearly delineated?	☐	☐
g) Was the project evaluation plan appropriate and timely?	☐	☐
2. Installation Evaluation		
a) Was the Management Plan implemented as proposed?	☐	☐
b) Was the PAC established and used as planned?	☐	☐
c) Was the search for information implemented as planned?	☐	☐
d) Were the tasks and activities started as provided for by the Management Plan and Timeline?	☐	☐
e) Were the members of the PAC representative of the agencies or organizations who should provide input to the project?	☐	☐

Criterion	Yes	No
3. List of Professional preparation and improvement needs of instructors (competencies) (Task 3)		
a) Was appropriate and sufficient project information included in the lists as described in the proposal?	☐	☐
b) Were the lists free of any indication of sex, age, or race bias?	☐	☐
c) Were they disseminated in accordance with the approved products plan?	☐	☐
4. Abstract (Task 6)		
Was the abstract prepared in accordance with approved format?	☐	☐
5. List of Validated Competencies for use in developing curriculum framework (Task 4)		
a) Was the list developed in format proposed?	☐	☐
b) Is the information clearly presented?	☐	☐
c) Does the design and content of the list achieve the objective for which it was prepared?	☐	☐
6. State-of-the-Art Paper (Task 6)		
a) Was the paper produced in the format requested?	☐	☐
b) Did the information in the paper meet the specifications of the RFP?	☐	☐
7. Evaluate all project activities and outcomes (Task 7)		
a) Did the evaluation plan provide for an evaluation of all project tasks and activities?	☐	☐
b) Were all tasks achieved?	☐	☐
c) Were there identifiable indicators that the project objectives were achieved with the desired impact?	☐	☐
8. Reports (Task 5)		
a) Were reports submitted within the timeframe specified?	☐	☐
b) Was sufficient information provided to monitor the project performance?	☐	☐

Criterion	Yes	No
c) Did the reports comply with the specifications stated in the proposal?	☐	☐
d) Did the draft final report provide an accurate description of the project procedures and results?	☐	☐

9. Comments:

Evaluator: _____

Appendix H
Comments Made By Responding Evaluations

Appendix H

Comments made by Evaluators of the project and Final Report

"It is not clear that the work produced in this project is worth the funding provided. There is a lot of paper that simply regurgitates knowledge available."

"Occupation Competencies for students are duplicative in many cases (items 12 & 72, 24 & 77 for example)."

"The report does not recognize any impact of the work being done to incorporate a mandatory Computer Literacy course for all junior high school students in Texas. The impact -- on the Vocational Education data processing program -- of other computer courses offered in secondary schools is not addressed (i.e. mathematics, business, computing science, science, etc.)."

"The Project Evaluation Form is based on responses to many materials not readily available to the evaluator (i.e. original proposal, original timeline, plan, format, etc.)."

"The list of Professional Development Needs reads like a laundry list of every skill any good school teacher should have. How do these apply specifically to Vocational Education teachers of data processing?"

"Item 1--Should have had more industry representatives on the PAC."

"Item 4--This seems to be a list of responsibilities/competencies and should be labeled as such and not 'needs'."

"Item 5--The 'State of the Art' paper did not address items listed in the abstract of the project. 'Other' 07.0399 should be further itemized. This item could be deleted because it was not listed in the specifications of the RFP."

"Final Report---Proper expository style should be used for quotes in the 'Introduction'.
---p. 20 --Are teacher/student competencies the same?
---A bit verbose in background explanations."

"Excellent."